Scientific Review
AND
SCIENTIFIC AND LITERARY REVIEW,
A RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,
INCORPORATING THE
Journal of the Inventors' Institute.

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VOL. XI.—No. 1.] [NEW SERIES] JANUARY 1, 1876. [PRICE 6d.

⁂ *Communications to the Editor to be addressed to him at 21, Cockspur Street.*

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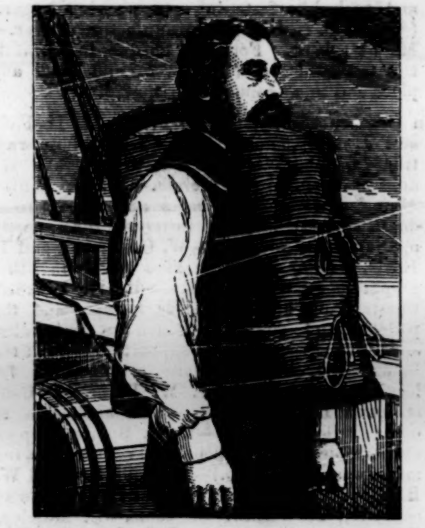

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JANUARY 1, 1876.

THE NATURE OF LIFE.

"*Audi alteram partem*" is a maxim of such obvious equity that it is readily acknowledged by all right-thinking people as being a primary rule of any well-ordered community, seeing it inculcates the propriety and necessity of duly considering all that can be said on either side of a question before arriving at a decision.

That this rule ought to be applied in the consideration of the important question of the nature of life will be immediately acknowledged by every one who calls to mind that on one side of the question we have such able scientific celebrities as Tyndall, Huxley, and Darwin, whilst the opposite view of the question has hitherto been maintained by persons who are for the most part ministers of religion, or those who are their intimate friends and coadjutors. Now, however, there comes before us one who, if not the equal of the great men above-named, is at least well entitled to respectful attention as being an able, learned professor of established reputation. Professor H. Alleyne Nicholson, to whom we allude, cannot be considered as other than an authority on a matter of this kind; and as he really only asks us to consider whether after giving grave consideration, to all that is advanced by Dr. Tyndall and his friends, we nevertheless ought to decide against them so far as to withhold our assent to the doctrine that matter is not simply automatic by its inherent energy acting concurrently with the ordinary vitalising forces of Nature, and so the vast and wonderful variety of forms of life now existent, subject to ordinary general operations of nature, are, so to speak, self-formative and self-sustaining; for Professor Nicholson, on the other hand, affirms that a great and powerful creative and directing intelligence has formed, and sustains, the living system *in all* its divisions. The Professor argues for this view of the subject with so much ability and clearness that we cannot do better than present his own words to our readers. We will, therefore, quote from his Introductory Lecture to the Course of Natural History delivered in the United College, St. Andrew's, 3rd November, 1875, which has been published by Messrs. William Blackwood and Sons, with the view of bringing his thoughts before a larger audience than that to which he orally submitted them.

After carefully reviewing the various general questions involved in the consideration of his subject, Dr. Nicholson says:—

Having now cleared the ground by these preliminary considerations, the leading theories as to the nature of life may be stated as briefly as follows:—We take a living body, however simple, and even if consisting of nothing more than a single microscopic mass of protoplasmic matter—such, for instance, as an Amœba or a white blood-corpuscle—and we observe (1), that it has the power of movement; (2) that it can nourish itself and grow by the assimilative transformation of foreign matter; (3) that it can reproduce itself. Now, how can we explain its possessing these marvellous properties, and exhibiting these astounding phenomena, as they are when truly considered?

In dealing with this question, we have two classes of theories to consider—namely, the physical or material, and the so-called vitalistic. It is not meant by this that there are only two theories commonly held as to the nature of life, but simply that all existing theories, however diverse, may be reduced to one or other of these categories. First, as to the Physical Theories. The ordinary phenomena of matter appear beyond question to be due simply to movements taking place in the ultimate molecules of which the matter is composed. These movements may vary in amount and in kind, and may thus give rise to the most diverse phenomena, but they are all essentially of the same nature. Hence, so far as dead matter is concerned, there is no impropriety in saying that force is simply an affection of matter. You might have the matter without the force; but you cannot have the force, or its resultant phenomena, without the matter.

The advocates of the physical doctrine of life stretch this admission beyond the limits here assigned to it, and embrace in its scope all the phenomena of vitality. On this theory all vital actions are reduced to molecular movements of the protoplasm of which the living body is composed. The properties of living beings are asserted to be "as much dependent upon the mere qualities and nature of the material aggregate which displays them, as the properties of a metal, or the properties of a crystal, are the results of the nature and mode of collocation of the atoms of which these bodies are composed."—(Bastian.) On this view, therefore, "Life" is merely a form of energy or motion, and the vital forces of the organism are merely correlates of the ordinary physical forces. To put it in another form, the mechanical, chemical, and physical phenomena of the organism are wholly the result of transformations of the heat which it receives from the sun, and the energy stored up in its food.

As opposed to the doctrines of the physical school, we have the views held by the so-called "vitalists." In its crudest form this doctrine was held by the ancient philosophers of Greece, who believed that life was an independent principle, capable of being added to and again removed from ordinary matter. Later, it was held that in some central spot in the living organism there existed some kind of guiding, directing, and all-pervading power, or "vital principle," capable of "influencing all the organs and tissues of the body in much the same way as the master builder controls and directs the operations of his workmen."—(Beale.) Later still, again, it has been held that there is inherent in the protoplasm of the living body a peculiar power, which, for want of a better term, may be called "vital force," and which disappears from the organism when death takes place. This power is supposed to be in association with every particle of living matter, and is believed to be independent of the correlated series of chemical and physical forces. It is asserted to be superior to the ordinary forces of the universe in kind and order, and to control and regulate these. There is thus no reason to regard it as a mere "aspect" of matter, or as necessarily ceasing to exist when separated from the material substratum with which alone we know it to be associated.—(Beale.)

The vitalistic doctrine of life admits of various modifications and diverse reservations; but all forms of this doctrine agree in believing that there exists in the living organism something which is not merely a form of one of the ordinary physical or chemical forces, but is superior to these. On the other hand, all modifications of the physical doctrines of life agree in believing that the forces displayed by the living body are nothing more than the ordinary correlated forces of the universe in another form.

We may now compare these theories a little more minutely. In the first place, it is to be at once admitted that a large proportion of the phenomena exhibited by every living being are clearly physical and chemical, and are therefore due to the action of the ordinary correlated forces. Here is where the real difficulty of the case arises. It is impossible to deny that many of the actions of animals are purely or mainly physical or chemical. The point is—are all the actions of the living organism of this nature, or are some of them due to something else, distinct from the physico-chemical forces of the correlated series? Every one acquainted with the modern doctrine of the "conservation of energy" will admit at once that the mechanical and chemical forces of the organism are derived entirely from the transformation of the ordinary physical forces. Digestion is carried on by a modification of ordinary chemical affinity. Animal heat is derived from chemical combination. The force with which muscular movements are effected is derived from the energy stored up in the food on which the animal lives. All the forces of our globe, of this kind, are derived from the sun, and and in this sense we may safely accept Tyndall's dictum, that our future Shakespeares are "potential in the fires of the sun." If we have no sun, assuredly we shall have no Shakespeares, for life can only be carried on by the transformation of energy primarily derived from the sun. So far, the advocates of the physical doctrine of life are clearly correct, and stand within their rights. The question, however, is whether all the energies of plants and animals are either chemical or physical? and to this question an answer in the negative may be safely returned. On this point the advocates of the vitalistic doctrines are fundamentally right, if not right in details. Animals and plants exhibit phenomena which can not be explained simply by reference to the known chemical and physical forces of the universe.

As has been more or less dimly discerned by many investigators, and has been specially insisted upon by Mr. Croll, in his work entitled "What Determines Molecular Motion?—the

Fundamental Problem of Nature," James Croll, "Philosophical Magazine," 1872. the real problem is not as to the nature of the molecular movements of protoplasm which give rise to vital phenomena, but as to the nature of the cause which determines these movements. Indeed, the same may be said of the molecular movements of matter which constitute the ordinary physical and chemical forces of the universe. Heat, electricity, magnetism, and the like, are merely different kinds of movement taking place amongst the same particles of matter. The fundamental question is not "What is the particular force in action, or upon what does its exertion depend? but rather, What is it that causes the force to act in the particular manner that it does act?" It is quite true that the human mind is incapable of conceiving of force as acting at all, unless as acting in a particular direction. The force cannot be produced without at the same time being determined in space and in time; but what accounts for its production will not account for the direction it may take. The explosion of the gunpowder is a sufficient cause for the movement of the bullet, but it is clearly no cause for the bullet travelling eastwards rather than westwards.

Here we appear to reach the kernel of the matter at issue. The living organism, however simple, constitutes a system or vehicle for the action of the chemical and physical forces of the universe. We can account for the existence and ultimate constitution of these forces no better, and no worse, in the case of the living organism than we can in the case of ordinary non-living matter. The sole question is—Do these forces act in the living organism otherwise than they do in dead matter; and, if so, what is it that causes this different action, and determines their direction?

That the physical and chemical forces act differently in the living body to what they do in dead matter seems to be sufficiently proved by the fact, that whilst the matter of life ("protoplasm") is apparently identical in composition in all living beings, the vital phenomena exhibited are of the most varying character. No one can produce any adequate distinction between the protoplasm of a man and that of a sponge; but no one will deny that the vital phenomena exhibited by these organisms are of an extraordinarily different nature. With identity of force, and of the vehicle through which that force acts, we have therefore a marvellous diversity of results, and this diversity can only be due to differences in the cause which determines the molecular movements of protoplasm.

The advocates of the physical theory of life have endeavoured to evade this difficulty by assuming the existence of an inherent "directive force," either in the protoplasm itself, and constituting one of its natural properties, or in the "sun-force" which that protoplasm receives, directly or indirectly. We hear a great deal about "molecular organisation," "atomic machinery," being "built up by sun-force," "formative power of matter," and the like; and these, as Fluellen has it, are indeed "prave 'ords;" but they are nothing more than words, and a little observation and reflection will show us the fallacy of all this. Given a steam-engine and coals, you still require something to direct its action, and you cannot find that something in the dead machine or in the fuel. You get a certain amount of "power" or "force," but that is all; and you may use that power in an almost infinite variety of ways by directing it in different directions. It is only a man, however, who can determine the course which the power of the steam-engine shall take. To use a somewhat similar illustration of Dr. Carpenter's, you may go to any large manufacturing town, and you may hire or purchase a room "with power," as the phrase goes. What is it that you buy in such a case? Surely you do not purchase the power to do any particular thing, such as to weave cloth or to print books? On the contrary, you simply buy so much bare force, and it is for you to direct that force by suitable machinery into any channel that you may wish, and thus to render it available for the special purpose you may have in view.

When the advocates of the physical theory of life speak of protoplasm assuming the marvellous forms of organised beings by means of an inherent power of its own, they are employing a scientific fallacy. It is all very well to tell us that the forces which reside in living protoplasm are but the forces, physical and chemical, that rule amongst the particles of dead matter, and are therefore derived from the sun. So they are: nobody would think of denying it. The question to be solved is simply whether these forces constitute all that exists in living protoplasm, and to which its vital activity is due? The supporters of the physical theory of life say that they do, but in so saying they are proceeding upon the most improbable of assumptions. The vital phenomena manifested by even the simplest mass of living protoplasm are out of all proportion in extent and variety to the external stimuli, which form the starting-point of most of these phenomena; and the same stimulus may give rise to very different phenomena in different masses of protoplasm, or in the same mass at different times. As has been well pointed out by Mr. Croll, however, nothing could be more unfounded than the assumption that the power which directs the molecular movements of protoplasm in one path rather than another, is itself the very molecular movements in question. When protoplasm is said, by its intrinsic "directing power," to determine the motions of its molecules, and force these into certain paths or modes of motion, we are practically told that the production of force and the determination of force are the same thing, and that the action of a force can be determined by the same force. Without entering into the argument on this point, it may be said at once, however, that it can be logically demonstrated that "the production of motion and the determination of motion are absolutely and essentially different," and that "the action of a force cannot be determined by a force, nor can motion be determined by motion." It is not, therefore, only that the action of a force cannot be determined by the same force, but it cannot be determined by any force whatsoever.

In accordance with the views here laid down, we must conclude that there exists in connection with all living matter a "directing power;" but that this is a power superior to, and wholly independent of, the actual material molecules of that matter, and having nothing in common with the chemical and physical forces by which these molecules are set in motion.

The Professor concludes:—If we are asked, finally, as to what is this "directive force," which we are obliged to conceive of as residing in living matter, we might well reply that we are not bound to show what its real nature may be. Science leaves, and will always leave, us in ignorance of the ultimate nature of the universe. "Matter," "space," "time," "force," and the like, are terms which the necessities of our being compel us to employ, but which we can never entirely fathom, perhaps hardly conceive, with the finite capacities at our command. It is sufficient that we should be able to prove the existence of some such "directive power" in living beings as an actual fact. So much seems capable of scientific demonstration, but beyond this point "science" has no staff to rule or thread to guide. If we care to step beyond the limits of strict scientific inquiry, we may say that the "directive force" of living matter is the indwelling psyché, which we must believe to exist in all created beings, from the humblest weed up to man, the crown and glory of the universe. That, again, is derived from the God "in whom we live, and move, and have our being," and but for the persistent exercise of whose power, in the sublime language of one now passed away, "the whole material universe and its forces, in all their vastness, glory, and beauty, would collapse and sink in a moment into their original nothingness."

SOCIETY OF TELEGRAPH ENGINEERS.

THE annual presidential *conversazione* of this society was given at Willis's Rooms on the 21st ult., by Mr. Latimer Clark. Amongst the most interesting of the many objects exhibited was Mr. Robert Sabine's Wheatstone Collection of telegraphic instruments, ranging from the primitive five-needle telegraph of 1837 to some of the beautiful forms of apparatus invented by Sir Charles Wheatstone, and in use at the present time. Mr. R. S. Culley showed a case containing specimens of defects and damages occurring in submarine cables. By its side was a portion of the thin cable manufactured by the Gutta-percha Company, and laid down with weights from Dover to Cape Grisnez in 1850. The sample was taken up in September last, showing its form and insulation to have remained practically unimpared for twenty-five years. Messrs Siemens, Bros., exhibited some condensers, "exchange printing" instruments, and cases of cables. Mr. Alfred Apps, in an ante-room, had a powerful resistance coil, with a tasteful display of "vacuum tubes." Among the effects here shown was a continuous discharge of electricity through a ten-feet tube of rarefied air. Mr. John Faulkner performed some interesting experiments in relation to the waste and economy of electro-magnetic force, and amongst the novelties of the evening was an ingenious grapnel for submarine cables, devised by Mr. Frank Lambert. Messrs. Elliott Brothers—in addition to some "condensers," designed by Major Malcolm, R.E., and a box of platinum-silver resistance coils—placed on the table two of Hearson's patent strophometers, for indicating and registering the revolutions of steam engines. They were specially put forward in reference to their application to the paying-out gear of a cable-ship. Messrs. O. and F. H. Varley, Messrs. Warden, Muirhead and Clark, the Thermo-Electric Generator Company, and several other firms, furnished additional items of technical interest.

Reviews.

CONTEMPORARY ART.

"Thirty Etchings and Chromo-Lithographs after Eminent Artists of the Day, with Explanatory Text." Lippincott and Co., Covent Garden.

Amongst the handsome gift books of the season we are obliged to mention this work in blue and gold. If is more than an inch in thickness, and some sixteen in size, and the cost is £2 2s. Messrs. Lippincott, whose magazine we noticed last month, are American publishers, but the work has been got up in London; and some copies still may be had at the agency, 16, Southampton-street. The peculiar recommendation or spirit of the undertaking is that it conveys a very good idea of the modern French school, and that a history of each picture is given in the explanatory text. The subjects of the drawings in a good many instances have a Frith like interest. There is the study of Alexandre Dumas, the younger, for example, by A. Mengin. No. VI. with that gentleman at work at his table. "Spring-time," by E. Hedouin, who has been several times employed in painting frescoes for the decoration of public buildings, such as the Theatre Français and the Palais Royal; being a forest glade with two fashionably dressed young ladies plucking the early flowers. "Despair," by Cucinotta, who was killed by the Communists, is another good one—a well-executed etching. We noted a portrait of the prima donna, Mdlle. Neilsson, by Masson. A number of landscapes alternate. Pretty French pastoral scenes such as "Landscape with Cattle," by Roc Lian. Readers who can draw or understand the art might find it useful to have this book for reference; the delineation of trees in a bold clear manner may be learnt from a "Scene at Samoris," by Chauvel. The chromo-lithographs are very good specimens of the art, which has been introduced within the last few years; that is to say, printing in various colours, there having been previously only two colours, we believe. Of these the colouring and execution of Sylvia's dress in the portrait by Desandré deserve praise. As a matter of science and art, we are glad of the opportunity of noting the progress in this form of colouring. "Sylvia" is worth looking at with attention on this account. Further, the colourings made, as are found in Indian silks and fabrics, are very well given. The specimen, "Drawing without a Master," after Més, is really pretty—two little boys and a girl—one of them drawing his companion's head on a wall by tracing the shadow whilst the girl holds the head, where the colouring resembles an oil or water colour painting. There is a fortunate absence of the bane of the art — too much brickdust color. This is more evident than in one or two of the others, which however, deserve a valued place. We recommend this book to the immediate notice of our readers.

OUR LIFEBOATS.

"The Life-boat; or Journal of the National Life-boat Institution." Issued quarterly.

This publication, which is the organ of that very valuable society, the National Life-boat Institution, contains some very interesting and instructive articles, the first of these being a critical exposition of the Merchant Shipping Act, 1875, 38 and 39 Vic. cap., 88, affording some very pertinent observations on that enactment, though we are sorry to find the hackneyed idea pervades it that our common seamen of to-day are a deteriorated race, whereas the truth is that *seamanship* both in officers and men is from a variety of causes in a state of decadence. The Wreck Register and Chart for 1873-4 receives, as might be expected, full consideration, and much important information is given as to the life-boat service of this country.

SCIENCE SCHOOL BOOKS.

"An Elementary Treatise on Algebra." By the Rev. J. H. Robson, M.A. Chapman and Hall.

The object of the author of this little work is to give in small compass clear proofs of all the ordinary Algebraical Theorems. It is not a work for beginners, as, in view of reducing the compass of the work, much elementary knowledge is assumed to be possessed by students using it.

"Numerical Examples in Heat, for the Use of Teachers and Students Preparing for Science Examinations." By R. E. Day, M.A. Longmans and Co.

In this work theoretical principles are set forth by experimental examples above three hundred in number, well selected, and embracing mostly such as would really occur in a laboratory.

THE READY MADE PILLS.

"The Ready Made Pills of Our Day." By Prof. J. P. Remington; a volunteer paper read before the American Pharmaceutical Association.

The writer took samples of pills made in his own store, and samples from ready-made pills, or those prepared by manufacturers, comprising sugar-coated, compressed, and gelatine-coated. In order to give them equal advantage they were subjected to parallel experiments at a temperature of 100° F., a sample of each kind being placed in bottles containing water, acidulated water, alkaline water, and water with digestive material. In each case the result was in favour of the plain, uncoated pills, they being more soluble. The sugar-coated pill was next in solubility, then the compressed pill, and the least soluble was the gelatine-coated. The compressed pills were found to be slightly damp, the gelatine or glue-coated pills swelled considerably, but were much longer in dissolving. The particular variety of gelatine-pills examined were, when the coating was removed, found to be greatly deficient in weight, some weighing but 56 per cent. of the amount of the material which they should contain. The paper gave a description of the apparatus for making compressed pills, showing that they can be readily prepared, with a little experience, by any pharmaceutist.—*From the Druggist (American paper.)*

"HAND AND HEART."

The above is the title of a new weekly illustrated penny paper. The advance number, just received, contains some creditable wood engravings,—a piece of music—Prince Albert Victor, "God Shine upon the Face of England's Royal Child;" the words by the Rev. R. Wilton, M.A., author of "Wood Notes" and "Church Bells;" the music by the Rev. Sir Frederick A. Gore Ouseley, Bart.; also interesting tales, poetry, and miscellaneous matter. The work is intended for the perusal of the industrial classes generally. The publication is announced as conducted by the editor of "Our Own Fireside," "Homewords," &c.

Reviews Postponed.—"The Masque of Pandora, and other Poems," by Henry Wadsworth Longfellow. We are compelled to postpone several Reviews of very important works.

The printed copy of the address of John Pattinson, Esq., President of the Newcastle-upon-Tyne Chemical Society. It is a very careful examination of the condition of the manufactures on the banks of the Tyne, and of the recent improvement in the chemistry of the metallurgical and alkali works.

ON THE MOVEMENT OF AIR IN PNEUMATIC TUBES.

The following is the substance of the paper on the above subject by M. Bontemps as read at the Institution of Civil Engineers:—

The establishment of the pneumatic system in Paris afforded the author an opportunity, of investigating the movement of air in the tubes. For this purpose a system of registration was adopted, electric indicators, connected by wires with a chronograph, being placed at intervals along the experimental tube. Each indicator consisted of a box, containing two cams controlled by springs, and a projecting stud. At the spot where the box was attached to the tube, a hole was drilled in the latter, and the box was placed in such a position that the stud entered the hole in the tube, its rounded end projecting slightly beyond the inner surface. The carrier in transit struck the stud, which actuated the cams, and the electric circuit being thereby closed, a mark was made upon the chronograph. This instrument consisted of a train of clockwork giving motion to a cylinder, round which was wrapped a sheet of smoked paper. Parallel to the axis of the cylinder there was a carriage bearing two electric magnets, one in connection with the indicator in the tube, and the other with a second-beating electric clock. Each armature was terminated by a fine point, which reproduced on the smoked paper the oscillations of the palette. Motion was given to the carriage by a cord and weight. The carrier, in passing along the tube, closed the circuit on striking the studs producing a deflection in the straight line traced by one point on the smoked paper. The other point produced a regular indented line parallel to the former, each indentation representing one second. These lines alternated with one another. As soon as the observation was taken the smoked paper was removed, and the surface was fixed by placing it in a solution of gum. The moment of commencing the experiment was electrically noted by a commutator attached to the cock between the reservoir and the tube.

The experimental tube had a total length of 6,704 feet 8 inches. It was made of wrought iron 2.52 inches in diameter, in lengths of 16 feet $4\frac{3}{4}$ inches; and connected the central station at Rue de Grenelle, St. Germain, with that of the Place du Théâtre Francais. It was practically level, with a few curves of large radius; and was laid partly in the ground, partly in subways. Five indicators were employed.

The experiments showed that, at the moment when transmission commenced, the gauge index first fell, and then rose till it reached a fixed point, always lower than the initial pressure. Also, that the speed of the carrier gradually reached a uniform rate, the slight increase at the end of the journey having been due to a secondary cause not affecting the result obtained.

In other experiments the action of two carriers having a common movement in the tube was examined. The first carrier was stopped in the tube, after a transit of six seconds; the second was then despatched, and from the period of contact of each with the studs, data were obtained from which the author deduced: 1. That the time occupied by each piston in traversing the interval between two successive indicators closely approximated, which showed that the two pistons required similar periods to traverse similar distances. 2. That two pistons which had acquired their normal distance apart, preserved it throughout the whole journey. 3. That the progress of the carrier last introduced was independent of the initial position of the first. From No. 2 it followed that the density of the air was constant from the commencement to the end of the journey as soon as unfrorm movement in the tube was established.

The respective periods of contact with each indicator were 2·9 secs., 2·8 secs., and 2·9 secs. This practical identity was not accidental, but followed the general law, that the ratio of the periods of transit over two equal distances chosen arbitrarily on the line was, in the uniform period state, independent of the pressures.

THE POSITION AND PROSPECTS OF THE PATENT QUESTION.

By F. W. Campin, Barrister-at-Law, Secretary of the Institute.

The following is the substance of Mr. Campin's paper, as read at the Inventors' Institute, on 9th December, 1875:—

This time last year Inventors were on the tiptoe of expectation as to the character of the legislative measure for reforming the Patent Laws, which it was understood would soon be under preparation by the Lord Chancellor. Thus the closing days of 1874 were for the Inventors' Institute days of hope; how that hope was dashed away by the presentation of the Lord Chancellor's *late* Patent Bill—(happy I am to be able to speak of it as a *late* Bill)—you may some of you know; but as there may be some who do not know, you will, perhaps, permit me to briefly review the history of the recent movement.

The Lord Chancellor having been appealed to early in 1874 by the Inventors' Institute, he, for cogent reasons, deferred receiving a deputation till the latter part of that year; and did receive it on the 14th December, 1874.

Among the gentlemen composing this deputation were—Sir Antonio Brady, the President of the Inventors' Institute; Mr. F. W. Campin, barrister-at-law, Secretary of the Institute; Mr. Hinde Palmer, Q.C.; Mr. James Howard, late M.P. for Bedford; Captain J. H. Selwyn, R.N., Messrs. C. G. Carttar, Henry Hand, John C. Peacock, H. J. Surmon, Marshall M. Harris, Thomas Patterson, Samuel Howard, John Lancaster, Peter Love, Frederick H. Varley, George Savage, T. Morgan, John Ford, Henry Broadhurst, T. Blanchett, A. J. Murray, Newton Wilson, Dr. J. Macgregor Croft, H. C. Coulthard, Samuel Calley. The Lord Chancellor was accompanied by Mr. B. Woodcroft, F.R.S., Clerk to the Commissioners of Patents; Colonel Stuart Wortley, Curator of the Patent Office Museum; Thomas Webster, Q.C.; H. D. Jencken and T. R. Bailey (Honorary International secretaries of the Association for the Reform and Codification of the Laws of Nations, Mr. Lister, Mr. W. E. Newton, and several gentlemen connected with Patent buiness were present.

Sir Antonio Brady introduced the deputation, and explained that the object of the visit was to ask the noble and learned lord's assistance in obtaining an amendment in the Patent Laws, and, in a very able manner, pointed out the importance of the Patent Laws, and the necessity for amending them; suggesting that the American system might be considered as worthy of being regarded as an available basis for an acceptable scheme of amendment.

As Secretary of the Institute, I then read a memorial, which shewed the views of the Institute to be in accordance with the remarks of Sir Antonio Brady: cheapness of cost of patent being, however, mentioned as a main requirement of a good Patent Law. I also stated that I thought it would be right to inform his lordship that it was not until after communication with many leading inventors, and much consideration of the subject, that the Inventors' Institute decided upon selecting the American law as a basis to act upon, and although the Institute had prepared the draft of a Bill incorporating that system in an amended Patent Law for this country, they preferred not to embarass his lordship by pressing it upon his attention just then. There were one or two points, however, in the American system which they should object to. One was that which obliged an inventor who applied for a patent to send in a model of his invention. That would be in some instances a very great burthen upon inventors. In many cases it would throw on the inventor the expense of a hundred pounds or more. It would be an injury to inventors more than anything else. Therefore some change should be made on that head. But there were many other provisions in the American law which his lordship would find to be very useful, and of great advantage to inventors. In these views

Mr. Hinde Palmer, Q.C., who had been a member of the committee of the House of Commons which inquired into the working of the Patent Laws in 1871 and 1872, Mr. J. Howard (late M.P. for Bedford), Capt. Selwyn, R.N., Mr. T. Paterson, and others, expressed their concurrence; some, however, appearing to favour the system of compulsory licenses.

The memorial referred to, with a report of the proceedings of the deputation, will be found in the *Scientific Review*, January and February, 1875.

The subject thus brought before his Lordship was not treated by him with neglect or indifference, for early in the last session of Parliament (1875), he presented a Bill, which inventors discovered upon reading it, was framed apparently more with the view to the discouragement than the encouragement of inventors.

It is true the Bill was a good one—in as far as it codified the law—and tended to reduce the present hap-hazard course of patent practice to a definite system; but as I stated to his Lordship in a letter I sent him, soon after his Bill was published, although the intention of the Bill was worthy of applause, as being framed with the view to deal out evenhanded justice to inventors and to the interest of the public, real or supposed, as far as they are considered to be antagonistic; yet, if some of its clauses were passed unmodified into law, a fatal blow would be struck at the progress of invention in this country, inasmuch as the operation of these clauses strongly tended, in a very considerable degree, to discourage inventors from bringing into public notice and industrially developing their inventions, especially in those numerous cases where inventors have to act with money supplied by others in the very outset.

My statement of objections to the Bill, which refers to it clause by clause, as far as the clauses are objected to, which objections were afterwards concurred in by the Institute and inventors generally, were these:—

Clause 6. Passing by the practical objection that two to four examiners, as named in this clause, cannot, according to the opinion of competent judges, be sufficient for the proposed work, it must be said:—

Clause 7. That the referees would be objectionable, inasmuch as, not being paid officials, they would be to a great extent irresponsible, and since, if they are to be of any real value, they must have had practical dealing with matters of invention, they will, unless superhuman, be biassed, perhaps even venal; and although a safeguard is provided in the form of a declaration of non-interest, this would in the very nature of things be of little avail.

Clause 8. The requirement in this clause of a full specification at the time of application, *unless great facility* be *given for amendment, and also for additions*, will be a serious objection, for it is well known that inventions do not come into the world, as Minerva sprung from the head of Jupiter—fully equipped at all points—but are first conceived as to principles and characteristics, and then elaborated as to working details by practical experiment, for which our law has hitherto made some provision by allowing time between the filing of the provisional and final specifications.

Clause 10. What is stated above as to referees will apply here.

Clause 11. The examination, as regards sub-clauses, *d*, *e*, and *f*, will prove most prejudicial to the recognition of the claims of inventors, *f* particularly so.

The power to any man or set of men to decide the *worth* of an invention, such as is given by this clause, before the invention has been practically tested in the workshop, or by actual industrial use, is one that those who know anything about inventions must at once acknowledge as most arbitrary—moreover, a power that cannot be used without the recurrence of frequent mistakes and much injustice.

No examination, *in limine*, can fairly be hoped to be equal to the decision of anything beyond "novelty," which is often very difficult to decide, as is evidenced by the trouble and difficulty attending patent lawsuits, which, be it noted, take place *after* the invention has been brought into practical use, and can, therefore, be judged of by practical results.

Clause 12. This clause, which refers to a reference to the law officer *in all cases*, is, I would most respectfully submit, undesirable, and I would suggest that the reference to the law officer should be restricted to those cases where the applicant contests the examiners' decision, or an opponent appears.

The law officers have so much other important public work to do that they have no time to spare for this, and they are not appointed in regard to any special fitness for dealing with patent matters.

Clause 13. The requirement of a notice to proceed *after* the examiners' report and law officers decision seems to be a mere formality, serving only to give trouble to inventors.

Clause 16. This, which is copied from the Act of 1852, has always been considered, as far as the limitation of the claim to seal a patent under a warrant more than three months' old is concerned, as of little or no value, except as a stumbling block to inventors. The limitation of sealing to seven days before expiration of provisional protection will, it is feared, be found very objectionable. Any protection it might afford against "racing" to the Great Seal might be more directly provided against.

Cause 19. It is suggested that the representative of a foreign patentee, duly authorised by a power of attorney, be allowed to obtain a patent as well as the foreign patentee himself.

Clause 21. The terms of this clause, which are intended to authorise amendments, are so stringently restrictive that no practical advantage could possibly be obtained under same.

Moreover, almost all other Patent Laws than those of this country allow not only *amendments*, but *additions* of *subsidiary practical* details to be made, and it would be of immense benefit if this were allowed, at all events during the progress of the patent. Indeed, this would be the only way to render the requirement of a full specification in the first instance tolerable.

[On this point the Lord Chancellor so far gave heed to my objections that he, at a further stage of the progress of the Bill, entirely recast this clause, and proposed very liberal rules as to amendments and additions.]

When amendment is refused to be allowed there ought to be an appeal permitted; this is not expressly provided for. The fee or stamp for amendment ought not to exceed £2.

Some of the other clauses are open to objection (such as the proposed compulsory licence clause), but most of them relate to undoubted improvements in the law.

It is scarcely necessary for me to remind you that opposition to the Bill came from all sides. The Inventors' Institute, who actively engaged in the work of opposition, enlisting therein the organizations of working men and other inventors, by means of conferences held at Sir Antonio Brady's offices, and by a General Conference on the 25th May, at the Society of Arts, to consider and take action as to the course to be pursued to amend the Patents for Invention Bill. Besides members of the Inventors' Institute there were present members of the Society of Arts, of the Institute of Civil Engineers, and representatives from the Artizans' and Inventors' Patent Bill Amendment Committee, the London Patent Agents' Committee, the Parliamentary Committee of the Trades Congress, and various Trades Councils, amongst others, Manchester, Rochdale, Preston, Oldham, Sheffield, Walsall, Liverpool, Messrs. Caiger, Tobacco trades; Bailey, Amalgamated Tailors; Wadkinson, Boiler-makers; G. Odger and G. Shipton, London Trades Council; Alfred Walton, Stonemasons; Povey, Maidstone trades.

At this meeting Sir Antonio Brady presided, and Mr. Campin acted as Secretary; various resolutions being passed disapproving of the terms of the Bill, and affirming the necessity of Patent Law Amendment, all which have been reported in the Scientific and Literary Review for June, 1875. These conferences the Institute followed up by petitions to Parliament, by deputations to the Government, and other suitable action. Independently of the Institute, a committee sitting at the Institution of Civil Engineers, a committee of Patent Agents, a committee of Artizans and Inventors, and various trades' organizations entered heartily into the work of opposing the Bill, which, after passing through the House of Lords with some amendments, dragged its slow length along in the House of Commons, threatened by the opposition referred to, at every movement, and, in the end, was allowed to drop without the Government making the slightest sign as to whether they would again bring the matter forward or not.

We have, therefore, now arrived at a new session of the Institute, with the position of the Patent question in as much a state of uncertainty as ever; and considering that the Attorney-General of last year has been promoted to a judgeship, and thus removed from this sphere of action, it is difficult to say whether anything is likely to be done or not. The only chance of the matter being again pressed forward seems to be that Mr. Mundella M.P., who gave great assistance to the action of the Inventors' Institute last session, has stated that he will move in the matter, and that recently the Trades Congress passed resolutions to the effect that action on this subject should be taken under its authority.

As to what course had better be taken in the matter by the Institute, I fear I cannot at present say much, the aspect of the question being too vague and uncertain; but I am disposed to say: Press forward for the passing of a Bill based on the Lord Chancellor's, but having those points changed and modified which have been agreed upon by the Institute and a large majority of those who have given attention to the subject, which are—in substance—the same as I stated in my letter to the Lord Chancellor, which I have already recapitulated, and which will be found definitely enumerated in the petition to Parliament of the Executive Council of the Inventors' Institute, as given in the Scientific Review (August, 1875); and, as far as giving shape or form to such a legislative measure, I would respectfully refer to the proposals for amending the Bill, published by me in the May (1875) number of the Scientific Review.

On one point, however, I think there is still room for further discussion as to what Patent Law Amendment ought to embrace, and it is this: Whether examiners of any kind are absolutely required, as I am inclined to think that if the Records of the Patent Office were *really well classified*, and cheaply published, that inventors could and ought to be bound to do the examination for themselves, which would remove the objection of the immense expense, and difficult questions attending the official examination system, from being a hindrance to Patent Law amendment; and on this point it must be remarked that if official examiners are to be appointed, still, their action must be preceded by a better classification, and more prompt and systematic publication of Patent Records.

The Chairman (M. M. Harris, Esq.), having invited discussion on this paper,

Capt. Bingham narrated his recent experiences of the working of the Patent Law in the United States, of which he expressed his approval, especially as regarded the close scrutiny of every application for a patent received in America.

Mr. A. J. Murray and Mr. Harris also spoke in favour of the American system.

Mr. Morgan, however, stated that the American system, pure and simple, would not be a good one to adopt; for, independently of the compulsory deposit of models, which was objectionable, the examination system did not come up to what it professed to effect, and it never could do so. He quite agreed that no patent ought be taken out without inquiry into whether it was for a novel invention or not, but he was, like Mr. Campin, inclined to think that properly and officially assisted inventors could make inquiry for themselves.

Mr. Mottershead supported Mr. Campin's idea of merely asking for a modification of the Lord Chancellor's Bill, instead of pressing for a new measure of a more thorough character, for his political knowledge led him to believe that the Legislature was so littie favourable to the claims of the inventor, that there was no chance of their being fully recognised and adopted.

Mr. Calley stated his concurrence in Mr. Mottershead's views, and with votes of thanks to the Reader of the paper and the Chairman, the proceedings terminated.

RECENT AMERICAN INVENTIONS.

Improved Plough.—Irvin Freeman, Corpus Christi, Texas.—This invention relates to a shovel or subsoil plough, and consists of a hook rod attached thereto, and a lever having a pawl that works in a beam rack. This mode of fastening a subsoiler or shovel to a skeleton frame is found in practice to be very convenient, and a great labour-saving device.

Improved Harrow.—William Frank, Mound Station, Ill.—This invention relates to certain improvements in harrows, and it consists in three equilateral triangular frames, constituting a sectional harrow in which the parts are capable of use either singly or collectively, and with either angle for the front. The invention also consists in the peculiar construction of the draft attachment and the means for coupling the sections together.

Improved Corn Husker.—William Allen Dick, Cleves, Ohio.—This is a kind of pod auger-shaped tool, with a pointed top a little in advance of the cutting lip arranged on a horizontal revolving axle, in combination with a sliding table to feed the corn ears up to the tool. The object is to remove the shucks without the loss attending the old methods, and to leave them prepared for use without the tubs.

Improved Scroll-sawing Machine.—Jerome H. Plummer, Brooklyn, N. Y.—The new features in this machine are a reciprocating saw frame (attached to a table extension), and slotted arms above and below, which serve as guides for the frame. The extension has a curved arm, which supports a shelf for holding tools. The machine is general, is compactly built, and well adapted for foot water.

Improved Car Coupling.—John H. Johnson, Brooklyn, Mich.—The new feature in this is a fulcrumed side lever attached to a vertically swinging draw-head, which last may be set and worked at any height for coupling. There are also devices to prevent the escaping or detaching of the links.

Improved Lever Power.—Henry C. Bell, Edina, Mo.—A vibrating lever is provided with notches or sockets, adapted for receiving the links or chains which pass around the object to be raised. The lever is suspended and vibrated on a central pivot, so that the hoisting chains are alternately slackened and subjected to strain, each chain being shortened when slack. The operation of alternate slacking and straining is continued until the shortening of the chain has raised the object to the desired height. This application of power is utilizable in a large number of ways.

Improved Device for Changing Speed.—Joseph W. Mead, Dupont, Ind.—Instead of the cone pulleys and belts now in use, a conically faced disc is proposed, located on the driving shaft that transmits the power by conical friction wheels to a similar conically faced disc of the shaft to be driven. The shaft of the friction wheels are hung to boxes of a sliding and spring acting frame, and the wheels are adjusted by suitable lever mechanism.

Improved Sewing Machine.—Josiah Glines and Noel W. Stiles, Postsville, Iowa.—The novelty here is a shuttle carrier mounted on a pair of cranks, and operated by a crank on the driving shaft in such a manner that the shuttle travels in a true circle without revolving on its own axis, and thus does not twist the thread. This invention is one of considerable importance to sewing machine manufacturers, and we would especially commend it to their attention. The effect of swinging the carrier in a circular orbit, without revolving it, not merely avoids twisting the thread, but also saves friction and prevents noise. The mechanical device used is at once ingenious and effective.

Improved Nut Fastening.—Robert C. Watson, Maysville, Ohio.—An eye stud is formed on each end of one of the fish bars, to receive one end of a locking plate. Said plate has holes to fit over the nuts, and its other end is connected at the middle of the joint, where it meets another similar plate fastened to the other end of the fish plate. The two plates are fastened on the stud by a split key, so that they can be readily put on and taken off.

Improved Windmill.—John Cook, Harlem, Ohio.—In this the crank-shaft bearing is connected to the horizontal beam which supports the machine in a simple and efficient way by means of stirrups or yokes. Another new feature is a joint in the beam for the tail vane to swing around out of the wind when it blows too strong, in combination with a weighted lever for keeping the vane in the wind.

Improved Carriage Curtain Fixture.—Daniel R. Knight and John M. Ripple, Waynesborough, Pa.—This invention relates to certain improvements upon carriage fixtures for which letters patent No. 166,114 were granted July 27th, 1875; and it consists in the improved construction of the roll, the method of attaching the curtain thereto, a stop devise for adjusting and regulating the height of the curtain, and the means for fastening the sides of the curtain.

Improved Lantern.—Patrick J. Clark and Joseph Kintz, West Meriden, Conn.—A yoke attached to a metal cap above the globe holds the latter to the lantern, while allowing said globe to rise and fall. There are new devices for concentrating the air on the flame, and for the ready admission and securing of the burner. The invention is quite simple and easily constructed.

Improved Lathe for Turning.—Louis K. Scotford, Burlingame, Kan.—In this machine, revolving cone pulleys turn on a stationary centre, and have a face plate fitted on the face of said centre so as to slide freely forward and backward. This slide, which is to carry the work, has a slot which works on a stud, projecting from the stationary centre, so that it can be shifted toward and from the axis. This causes the plate to slide, more or less, according to the distance the stud is located from the centre. The arrangement is a very simple one for oval turning.

Improved Ventilating Apparatus.—John C. Bates, Cold Spring, N.Y.—This inventor proposes an apparatus for ventilating rooms by introducing any desired amount of fresh air in such a way as not to produce a draught, and by which the foul air may be expelled from the room, thus causing a circulation and keeping the room thoroughly ventilated. A horizontal pipe communicating with the outward air has a drum pierced with flues interposed between the register and the hot air flue. The said inlet pipe is combined and communicates with a vertical column far enough above the heads of the occupants to relieve them from the bad effects of a draft.

Improved Railroad Joint.—James G. Holliday, Pittsburgh, Pa., assignor to himself and Frank E. Hutchinson, same place.—This inventor has devised a plate for binding the rails on the ties, arranged under a shoulder of the fish plate, and contrived to form a lock for the nuts.

Improved Metal Shears.—Thomas C. Livesay and Henry H. Black, Montana City, Kan.—In this device we have a novel mode of applying the movable and stationary cutters to the bed of a lever-shearing machine. An edge-curved cutter is made fast to and raised diagonally above thn bed, and the lever-cutter is pivoted to the bed at one end of the stationary cutter.

Improved Pump Bucket.—Eugene J. Dunbar, Romulus, Mich.—This is a bucket for suction pumps, so constructed as to fill the cavity of the pump cylinder at each upward stroke, and to open at each downward stroke. The device is made of india-rubber, in cylindrical form, with a bell-shaped cavity in its lower end, and with longitudinal holes through it. There is a conical iron valve, and a rod for limiting the action of the same.

Improved Piston Packings.—Christopher R. James, Jersey City, N.J.—This inventor proposes a series of packing rings tapered on the inside to correspond with a spring, and so placed that the spring presses them out against the cylinder, and also against the piston and the follower, thus tightly packing the joint.

Improved Method of Constructing Gaols.—John A. Seeber aad James C. Croxton, Rockwall, Tex.—One of the most important subjects brought to the consideration of the Prison Congresses lately held in England, and to which the Prison Association and other philanthrophic bodies are giving much attention in this country, is the proper construction of gaols. The present inventors offer a new plan of construction, mainly directed to ensuing good ventilation. The intermediate space of the double floor is constructed with diagonal channels, running from the outer walls to the centre of the building, with grated openings in the walls, and similarly grated openings at suitable points of the upper part of the floor. The different compartments are thus supplied continually with fresh air entering from the outside and passing to the inside. The outer walls serve for the purpose of ventilation and security in the same manner as the floors, and are also provided with air flues, having grated entrance and exit openings at different points, for supplying air without the possibility of communication with the outside, so that no tools, &c., can be introduced. The different stories are ventilated in this manner, and the bad air carried out through the grated inside doors.

Improved Eaves Trough.—Otis W. Stearns, Johnson, Vt.—This eaves trough may be conveniently put up, and may be made of any desired length. It is formed of semi-cylindrical sections, made with half ring tenons upon their ends, and semi-cylindrical couplings, made with half ring sockets in their edges, and provided with spikes for securing them to the wall.

Improved Dumping Wagon.—Albert A. Hoch, Reading, Pa.—This is a new form of that class of dumping wagons which are provided with chutes or troughs to facilitate discharge of their contents. The essential features are a hinged door and hinged side guards, arranged and connected with a hinged chute and the wagon body. The whole forms a very simple and doubtless effective device.

Imporved Weather Strip.—Francis A. Bradshaw, Lebanon, Mo.—In this we have a weather strip for doors by which no water is allowed between the door and the threshold strip, and the drip water is carried off in effective manner. An adjustable elastic weather strip fits on the threshold strip, that is provided with a groove and outwardly inclined mortises for the drip water. The groove is covered by a perforated metallic plate.

Improved Lamp Chimney.—George M. Bull, New Baltimore, N.Y.—This inventor patented a lamp chimney on January 9, 1872, and now proposes to make it simpler in construction and less expensive. To this end, around the edge of a rectangular plate is formed a narrow upwardly projecting flange, which covers the outer side of the lower end edges of the transparent plates. Plates of thin sheet metal are bent longitudinally at right angles, the lower ends of which fit into the angles of the flanges at the corners of the plate, and are designed to receive the side edges of the transparent plates. The upper ends of the angular strips are inclined inward slightly, giving to the chimney the form of a truncated rectangular pyramid. Novel devices are added to enable the mica plates to be put in and taken out, as may be required.

Improved Sash Holder.—Hiram Torrey, Philadelphia, Pa, and Darius Lyman, Washington, D. C.—The invention relates to a device designed for application to a window sash for the purpose of arresting and supporting the same by frictional contact with the jamb. The chief elements of the device are a movable or adjustable elastic wedge, and an elastic roll mounted on a fixed pivot, the former being connected with a pivoted spring lever and so arranged as to adapt it for insertion, between the roll and jamb, to lock the sash.

Improved Washing Machine.—Irwin A. Shaw, Grand Meadow, Minn., assignor to himself and John E. Joslyn, of same place.—This is an ingenious combination of mechanism in which rollers, springs, and an endless apron play the principal part, the effect being that the clothes are alternately drawn through the water, and then between rollers, and are thus washed clean very quickly and without being injured.

Improved Key Hole Guard.—John La Blanc and Xavier St. Pierre, Ophir city, Utah, Ter.—In this way we have a little plate made to slide over the outside key hole of a lock by a knob on the inside. The knob works the plate by a crank and connecting rod, turning them down below the centre of the crank on a stop pin, when the slide covers the hole, so as to effectually prevent the slide from being forced back except by the knob. The sliding cover is secured behind an outer case, so as not to be wrenched off.

Improved Pan.—John C. Milligan, South Orange, N. J., assignor to Lalance and Grosjean Manufacturing Co., New York city.—The object here is to enable pans to he made thinner and lighter metal than is ordinarily the case, without detaching from the wearing quality, and also to increase the capacity of the utensil. The middle portion of the bottom has a downward deflection, and, on the part outside of this, legs or studs are attached.

Improved Folding Cradle.—John Weich and John Jefferys, New York city.—The bottom of the cradle is hinged to one side so as to turn up. The ends are each made in two parts hinged together, and are also hinged to the sides. The rockers are pivoted at one end, and secured at the other by movable pins. With this construction the cradle may by folded so as to require but little space, and be compact in form.

Improved Stove.—Robert S. Bostwick, Jackson, Mich.—The air passes upward between the fire pots, from side channels into an air chamber, and then mixes with the smoke and fire gases from one fire pot. The sheet of air that is thus supplied to the top of the fire produces the more thorough combustion of the fuel and a higher degree of heat. The unconsumed smoke and gases of combustion are conducted by suitable passages downward to pass between cap and fire pot, and then in upward direction to the chimney.

Improvements in Making Patterns for Castings.—William E. Craig, Indianapolis, Ind.—This new and doubtless useful idea for making elaborate patterns for ornamental iron-work, etc., and one that is calculated to ensure considerable economy in time. The workman first models the form of the article in potter's clay. From this he takes a plaster mould, on which he casts a back mould also in plaster. In the last he casts a pattern made of a composition of beeswax, red lead, and resin. This is put back on the back mould, using it as a follow board, and on it is made another mould from which the sand mould is produced.

THE SCIENTIFIC REVIEW
AND
Scientific and Literary Review
Is published at the
OFFICES, 21, COCKSPUR STREET, CHARING CROSS,
LONDON, S.W.,

On the 1st of every Month, and sent post free on prepayment of the ANNUAL SUBSCRIPTION OF 6s. 6d.; or it may be had by order, from Messrs. KENT AND CO., PATERNOSTER Row, or any Bookseller or Newsagent in the kingdom, *price* 6d. *per copy.*

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4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE, LONDON
ESTABLISHED 1ST MAY, 1862.

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President of Council:

SIR ANTONIO BRADY.

SESSION 1875-76.

Thursday, January 13th.—On "Appliances for Railway Safety;" and, if time permit, Discussion on the Patent Question.

Thursday, January 27th.—Meeting to make arrangements for promoting Patent Law Reform in the forthcoming Session of Parliament.

N.B.—Members are specially invited to read Papers at the Members' Meetings during the Session.

Council Meetings at 7 p.m.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

AT the Executive Council, on 9th December, Captain Bingham's application to be allowed to exhibit the models of his Rudder and give personal explanations of it, was agreed to, and it was arranged that he should attend the Members' Meeting on that evening for the above purpose.

At the Members' Meeting, held on the 9th December, Mr. F. W. Campin read his paper "On the Position and Prospects of the Patent Question," and this, with the discussion thereon, is given in another column. Afterwards Captain Bingham exhibited the models of his rudder and fully explained its action. The description of this rudder has been already given in this journal.

Monthly Notices.

The death of Mr. R. Carrington, F.R.S., so well-known to all astromomers for his two important works, the "Redhill Catalogue of Circumpolar Stars" (for which he received the award of the Gold Medal of the Royal Astronomical Society in the year 1859), and "Observations of the Spots on the Sun from November 9th, 1853, to March 24th, 1861, made at Redhill," and published in 1863, is announced. Illness and other causes had led to interruption in Mr. Carrington's astronomical labours; but a few years since he established another observatory at Churt, near Farnham, and was found dead at his residence there on the morning of the 1st inst. In early life he had taken his degree with great credit at Cambridge, and shortly afterwards was appointed, in 1849, Observer at the Durham Observatory, where he remained three years before establishing his own observatory at Redhill, which he made so productive to astronomy.

Another Small Planet, No. 155, which is the eighth of his own planetary discoveries, and raises the number of planets found since the beginning of the present year to *fifteen*, was discovered at Pola, by M. Palisa. Hitherto, says the *Athenæum*, not a single *new* comet has been discovered, though a few observations of Encke's and Winnecke's periodical comets were made early in the year. No known periodical comet is due next year; but that discovered by d'Arrest in 1851 will be in perihelion early in 1877, and may perhaps be seen with powerful telescopes at the end of 1876. On the night of 22nd November M. Palisa again added another to the list by discovering No. 156.

At the Royal Society Anniversary Meeting in November, 1874, the regulation under which the election of Fellows takes place was called in question by one of the Fellows. It was contended that restriction of the number in each year to fifteen not only lessened their power and usefulness, but would reduce their numbers to a dangerous point. The question was referred to a committee, exceedingly well chosen for the purpose, and, as Dr. Hooker informs us in his Anniversary Address of the present year, the discussion was alike careful and comprehensive, and ended in a unanimous resolution *not* to recommend the Council of the Society to make any change at present. The applause with which this conclusion was received by the meeting shows that the majority of the Society are of opinion that their welfare will not be endangered by maintenance of the present rule of election.

The Meteorological Office and the Royal Society have, as regards relative positions, been again brought into question by Dr. Hooker. During nine years the business of the office has been directed by a committee of Fellows of the Royal Society serving gratuitously, notwithstanding the popular error that the £10,000 a year voted for the carrying on of the Meteorological Office was voted for of the Royal Society. The Lords of the Treasury have given notice that they have appointed a committee to inquire into the working of the office, and the value of the results hitherto obtained. The two principal questions with which the committee will concern themselves are—1, How far the statistics hitherto collected have led to the discovery or confirmation of meteorological laws; and 2, How far the principles upon which storm warnings are given have been justified by results? It is to be hoped that this inquiry will have good results for science.

The Obituary of the Royal Society from Nov. 30th, 1874, to Nov. 30th, 1875, is thus stated in the *Athenæum*. Three, Carrington, 47; Hanbury, 49; Sherard Osborn, 53; were under sixty: three, Kay, 60; Webster, 64; Selwyn, 69; were under seventy: fourteen, Blake, 70; Henwood, 71; Elliot, 72; Wheatstone, 73; Gray, 75; Kiernan, 75; Willis, 75; Yorke, 75; Key, 76; Locock, 76; Sanders, 76; Dean Hook, 77; Logan, 77; Gardner Wilkinson, 79; were under eighty: six, Lyell, 80; Ryan, 82; Vignoles, 82; Hardwick, 84; Hoppus, 85; Watts Russell, 88; were under ninety: and three, Briggs, 90; Burnet, 92; Cabbell, 94; were under one hundred. Clearly the Fellowship of the Royal Society is favourable to longevity; and if old age is honourable, our readers will agree with us that the foregoing list presents very remarkable instances. Sir Edward Sabine, elected a Fellow in 1818, still remains Father of the Society.

The Recent Exhibition of the Society for the Promotion of Scientific Industry resulted in a loss of £3,140. About £750 was subscribed at once towards meeting the deficiency, and it is hoped the whole sum will soon be realized. Lord Derby has been appointed President for the ensuing year.

Proceedings of Societies.

ROYAL SOCIETY.

NOVEMBER 18TH.—Dr. Hooker, President, in the chair.—The following papers were read:—"Report to the Hydrographer of the Admiralty on the Cruise of H.M.S. Challenger from June to August, 1875," by Prof. W. Thomson; "On the Physiological Action of Vanadium," by Mr. J. Priestley; "On some Elementary Principles in Animal Mechanics: VII. The Law of Fatigue," by the Rev. Dr. Haughton.

November 25th.—Dr. Hooker, President, in the chair.—The following papers were read:—"On the Replacement of Electro-Positive by Electro-Negative Metals in a Voltaic Cell," by Dr. Gladstone and Mr. A. Tribe; "On the Production of Glycosuria by the effect of Oxygenated Blood on the Liver," by Dr. Pavy; "On the Structure and Relations of the Alcyonarian Heliopora Cœrulea, with some Account of the Anatomy of a Species of Sarcophyton," by Mr. H. N. Moseley.

November 30th.—Anniversary Meeting.—The President delivered the anniversary address, and presented the medals: the Copley Medal to Dr. Hofmann, F.R.S., for his numerous contributions to the science of chemistry, and especially for his researches on the derivatives of ammonia,—a Royal Medal to Mr. Crookes, F.R.S., for his various chemical and physical researches, more especially for his discovery of thallium, his investigation of its compounds, and determination of its atomic weight; and for his discovery of the repulsion referable to radiation,—a Royal Medal to Dr. Oldham, F.R.S., for his long and important services to the science of geology, chiefly in Ireland and in India. The proceedings terminated with the election of the following as Council and Officers for the year ensuing: President, Dr. J. D. Hooker; Treasurer, Mr. W. Spottiswoode; Secretaries, Prof. G. G. Stokes and Prof. T. H. Huxley; Foreign Secretary, Prof. A. W. Williamson; Other Members of the Council, Prof. J. Couch Adams, Major-General J. T. Boileau, the Viscount Cardwell, Mr. Warren De La Rue, Capt. F. J. O. Evans, Dr. E. Frankland, Dr. A. C. L. G. Gunther, Prof. T. W. Jones, J. N. Lockyer, the Rev. R. Main, Prof. D. Oliver, Prof. E. A. Parkes, Right Hon. L. Playfair, W. Pole, C.E., the Rev. B. Price, and W. W. Smyth.

December 9th.—Dr. Hooker, President, in the chair.—It was announced that the following had been appointed Vice-Presidents: the Treasurer, Prof. J. C. Adams, Capt. Evans, Dr. Gunther, and Dr. W. Pole.—The following papers were read: "On some Electric-Magnetic Rotations of Bar Magnets and Conducting-Wires on their Axes," by Mr. G. Gore,—"On the Development of *Lepas fascularis*, and the Archizoea of Cirripedia," and "Preliminary Remarks on the Development of some Pelagic Decapoda," by Mr. R. V. Willemöes-Suhm.

ROYAL SOCIETY OF LITERATURE.

NOVEMBER 24TH.—C. Goolden, M.A., in the chair.—Mr. W. Moon read a paper "On some of the Difficulties and Peculiarities of the English Language," in which he gave an able and humorous account of the trouble any stranger from other lands must have in the acquisition of a tongue in which the sounds of many vowels and syllables must seem to him perfectly arbitrary, and not reducible to any definite rule. Thus, there are words, he showed, in which all the five vowels, *a*, *e*, *i*, *o*, and *u*, have identically the same sound; and occasional variations in the pronunciation of the consonants quite as confusing to the learner as are those of the vowels. Thus, in the word "icicle," the first and second syllables of which are spelt exactly alike, the sound is widely different—so, too, what would a foreigner think when told the true English pronunciation of *ch* in "character," "Charles," and "Charlotte," respectively?

December 23rd.—Mr. Vaux, the Secretary, read an interesting paper "On the Origin of the French Language," further notice of which we reserve.

ROYAL INSTITUTION.

DECEMBER 6TH.—Dr. C. W. Siemens, V.P., in the chair.—Several new members were elected.

ZOOLOGICAL SOCIETY.

NOVEMBER 16TH.—Osbert Salvin, Esq., F.R.S., in the chair.—The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of October, and called particular attention to a Scolopaceous Courlan (*Aramus scolopaceous*) from South America, purchased October 6th, 1875, and a Binturong, presented by Capt. A. R. Ord, October 19th. Mr. Sclater exhibited the upper horn of a Two-horned Rhinoceros that had been shot in March last by Lieut.-Col. C. Napier Sturt, F.Z.S., in the valley of Brahmapootra. Mr. Sclater remarked that this seemed to prove conclusively the existence of a two-horned species of Rhinoceros in Assam, which would probably turn out to be the same as that from Chittagong, now living in the Society's Gardens. M. Sclater read an extract from a letter addressed to him by Dr. N. Funck, Director of the Zoological Gardens, Cologne, stating that the bird figured in Mr. Sclater's recent article on the Curassows as *Pauxi galeati*, var. *rubra*, was the true female of *Pauxi galeata*. Mr. H. Sheebohm, F.Z.S., exhibited and made remarks on a series of rare and interesting Birds and Eggs from the tundras and deltas of the Petchora River, North Eastern Russia, collected there by Mr. J. A. Harvie Brown and himself during the present year. Mr. A. H. Garrod, F.Z.S., read some notes on the Manatee (*Manatus americanus*) recently living in the Society's Gardens. Dr. Gunther, F.R.S., read a Third Report on the Collections of Indian Reptiles obtained by the British Museum, and gave descriptions of several species new to science. A communication was read from Mr. E. Pierson Ramsay, C.M.Z.S., containing a List of Birds met with in North-Eastern Queensland, chiefly at Rockingham Bay. A second communication from Mr. Ramsay gave a description of the Eggs and Young of *Rallina tricolor*, from Rockingham Bay, Queensland. A third communication from Mr. Ramsay contained the description of a new species of *Pœcilodryas*, and a new genus and species of Bower Bird, proposed to be called *Scenopœus dentirostris*, from Queensland. A communication was read from Mr. Sylvanus Hanley, containing the description of a New *Cyclophorus* and a New *Ampullaria*, from Burmah. A communication was read from Dr. J. S. Bowerbank, F.R.S., containing further observations on *Alcyoncellum speciosum*, Quoy et G., and *Hyalonema mirabile*, Gray. Mr. Arthur G. Butler, F.Z.S., read a paper on a Collection of Butterflies from the New Hebrides and Loyalty Islands, and gave descriptions of some New Species. A second paper by Mr. Butler contained particulars of a small Collection of Butterflies from Fiji. Mr. Butler also read the Descriptions of several New Species of *Sphingidæ*. A communication was read from Mr. W. H. Hudson, C.M.Z.S., containing Remarks on Herons, with a Notice of curious instinct of *Ardetta involucris*. A communication was read from Dr. Otto Finsch, in which he gave a description of a new species of Crowned Pigeon from the Southern end of New Guinea, opposite Yule Island. Dr. Finsch proposed to call his bird *Goura scheepmakeri*, after Mr. C. Scheepmaker of Soerabaya, who had transmitted a living specimen of it to the Zoological Gardens, Amsterdam.

December 7th.—Geo. Busk, Esq., F.R.S., V.P., in the chair. The Secretary read a report on the additions that had been made to the Society's Menagerie during the month of November, and called particular attention to a female Beisa Antelope (*Oryx beisa*) from Eastern Africa, presented by H.H. the Sultan of Zanzibar, and received November 8th, 1875; also to two All-green Tanagers (*Chlorophonia viridis*) from Brazil, purchased 16th November, 1875, which were new to the collection. Mr. Sclater read an extract from a letter addressed to him by Mr. H. A. Wickham, on the occurrence of the large blue Hyacinth Macaw (*Ara hyacinthina*) near Santarem, on the river Amazons. Mr. Sclater exhibited and made remarks on a Skin of *Hypocolius ampelinus*, Bp., obtained by Mr. W. T. Blanford, in Upper Scinde, to the west of Shikarpur. Professor Owen, C.B., read the twenty-second part of his series of Memoirs on Dinornis. This part contained a restoration of the skeleton of *Dinornis maximus*. Mr. J. W. Clark read a paper on the Eared Seals of the Islands of S. Paul and Amsterdam, to which he added a description of the Fur Seal of New Zealand from specimens kindly furnished by Dr. Hector. Mr. Clark further read copious extracts from the narratives of the older explorers in these seas, and attempted to reconcile the notices given by them with the subsequent descriptions given by naturalists. A communication was read from the Rev. R. Bogg Watson on the generic peculiarities of the distinctively Madeiran Achatinas of Lowe. A communication was read from Dr. Hermann Burmeister, F.M.Z.S., Director of the National Museum, Buenos Ayres, containing the description of a new species of *Dolichotis*, which Dr. Burmeister proposed to call *Dolichotis salinicola*. Mr. W. T. Blanford communicated particulars respecting some large Stags' Horns, obtained by the expedition to Western Turkestan, to which the late Dr. Stoliczka was attached as naturalist, said to have been brought originally from the Thian Shan Mountains. These horns were of very large size, each measuring 51 inches in length round the curve. Mr. Blanford, considering that these horns clearly showed the existence of a species hitherto undescribed, gave a full description of them, and proposed to give the name of *Cervus eustephanus* to the animal to which they belong. Dr. O. Finsch, C.M.Z.S., communicated some Notes on *Phœnicomanes iora*, Sharpe, and *Abrornis atricapilla*, Blyth, and pointed out that the first-named bird is identical with *Iora lafresnayei* of Malacca, while *Abrornis atricapilla*, said to be from China, is in fact a *Myiodioctes pucillus*, Wils., a well-known North American bird. A second communication from Dr. Finsch contained the description of a bird from the Arfak Mountains, New Guinea, which appeared to form a new genus and species. This Dr. Finsch proposed to call *Pristorhamphus versteri*. A third communication from Dr. Finsch gave the characters of six new Polynesian birds in the Museum Godeffroy at Hamburg. A communication from Mr. J. Caldwell, C.M.Z.S., contained some notes on the Zoology of the Island of Rodriguez. Dr. E. Von Martens, C.M.Z.S., communicated a list of the Land and Fresh Water Shells collected by Mr. Osbert Salvin in Guatemala in 1873-4.

PHYSICAL SOCIETY.

NOVEMBER 27TH.—Prof. G. C. Foster, V.P., in the chair.—The following candidates were elected Members: Prof. O. Reynolds, Prof. H. J. Smith, Prof. R. B. Clifton, Messrs. C. Busk, J. Thomson, J. W. W. Waghorn, W. Esson, F. W. Bayly, and Prof. R. W. Emerson M'Ivor. Prof. Guthrie briefly described Dr. Kerr's recent experiments to show that glass, resin, and certain other substances exhibit a depolarizing effect when under the influence of powerful electrical tension, and he exhibited the arrangement of apparatus employed in the research.

He also showed certain experiments connected with the investigation. Dr. Guthrie then made a communication "On Stationary Liquid Waves," in continuation of that which he made to the Society in June last. If water in a cylindrical vessel, not less than nine inches in diameter, be agitated by depressing and elevating a flat circular disc on its surface at the centre, a form of oscillation is set up, which the author terms "binodal." He finds that these fundamental undulations in an infinitely deep circular vessel are isochronous with those of a pendulum whose length is equal to the radius of the vessel, and further—a fact which is extremely interesting—that the motions of the pendulum and water keep together throughout their entire paths. An arrangement was exhibited for experimentally demonstrating these facts. To the upper end of a short pendulum, with a heavy adjustable bob, is attached a cardboard sector, in the plane of vibration of the pendulum. A silk thread, attached to the edge of this sector, carries a small paraffin disc, which rests at the centre of the surface of the water contained in a cylindrical vessel. The pendulum-length is adjusted until the motion of the disc is isochronous with that of the water when the two are not in contact. Two other forms of motion may be produced in cylindrical vessels, namely (1) by alternately compressing and extending opposite ends of a diameter, as in the motion of a bell, this gives two diametral nodes at right angles to each other, and (2) by rocking the vessel, which gives a single diametral node. Each of these has its own period of vibration, the last being the slowest. They may be superimposed on each other, and a rotation of the water, however great, does not interfere with their formation. In rectangular troughs a binodal and a monodal wave system may be established. The former is induced by raising and depressing a wooden lath at the middle of the surface, and the latter by tilting. Binodal vibration in a circular trough may be compared with a vibrating pair of triangular laths, and in rectangular troughs to the balancing of two rectangular laths. In this latter case the nodes are at one-fourth of the trough length from each end. Some discrepancies are met with when we compare times of vibration in rectangular troughs of various lengths, and these are due to a scraping action which takes place against the ends of the vessel. The result of the experiments on binodal motion in rectangular vessels is to show that the undulations are isochronous with the oscillations of a pendulum whose length is $\frac{2}{\pi}$ times that of the trough. The chief points in connection with this subject to which the author referred, as still requiring explanation, are (1) Why are the motions pendular? (2) How is it that in circular binodal motion the times are identical with that of a pendulum of the given length? and (3) What is the mathematical connection between the individual motion of each particle and that of the mass. Mr. Lodge thought that valuable results might be obtained by treating the mass of moving water as a pendulum, with two bobs oscillating about the node. This might be especially useful with small oscillations, when the surface is practically plane.

December 11th.—Prof. Gladstone, President, in the chair.—The following were elected Members: Mr. C. Higgins and Mr. S. O. Thompson.—Mr. Lodge exhibited and described a simple form of chronoscope for measuring short intervals of time, which Prof. Foster has recently devised.—Prof. M'Leod described and exhibited an arrangement for ensuring that the charge given to a Leyden jar shall not exceed any fixed limit. Through a cork in the upper end of a bell-glass passes a brass rod insulated through its entire length by a glass tube through which it passes freely. To the upper end is attached a brass knob, and the lower end is pointed, and provided with a screw thread, so that it can be set at any distance within, or through, a hollow brass ball, perforated below and rigidly fixed to the glass tube. Within the bell-glass is a loose cage of perforated sheet zinc, and a vessel containing strong sulphuric acid. The whole stands on a metallic plate to secure a good earth connection. The action is as follows: If the rod be screwed down so that the point projects through the hollow ball, the upper knob and lower metallic plate being connected with the two poles of a Holtz machine, only short sparks can be obtained, because a large amount of electricity escapes at the point, but if the rod be raised so that the point barely enters the hollow ball at the top, no escape takes place from it, and the machine will give its full length of spark. By varying the position between these two extreme limits any required length of spark or amount of charge for an interposed jar can be obtained.

CHEMICAL SOCIETY.

NOVEMBER 18TH.—Prof. Abel, President, in the chair.—The following papers were read:—"On Ethylphenyl Acetylene," by Mr. T. M. Morgan, in which the author describes the preparation and properties of this derivative of phenyl acetylene, a hydrocarbon discovered some years ago by Glaser; "On Narcotine, Cotarnine, and Hydro-cotarnine, Pt. 2," by Mr. G. H. Beckett and Dr. C. R. A. Wright, is a continuation of their investigations of this subject; "On the Presence of Liquid Carbon Dioxide in Mineral Cavities," by Mr. W. N. Hartley; the author proves from the physical properties of the liquid enclosed in a cavity of a quartz crystal in his possesion, that it is carbon dioxide; and "Preliminary Notice on the Formation of Coumarin, Cinnamic, and other Similar Acids," by Mr. W. H. Perkin.

December 2nd.—Prof. Abel, President, in the chair.—The following papers were read: "On the Decomposition of Alcohol and its Homologues by the Joint Action of Aluminium and its Halogen Compounds," by Dr. J. H. Gladstone and Mr. A. Tribe. The action on alcohol gives rise to hydrogen and aluminic ethylate, a greenish-white fusible solid.—"Note on Incense Resin," by Dr. J. Stenhouse and Mr. C. E. Groves. The authors have succeeded in obtaining a crystalline substance and a liquid hydrocarbon from it.—"On the Occurrence of Native Calcium-chloride at Guy's Cliff, Warwickshire," by Mr. J. Spiller.—Mr. G. S. Johnson described "certain sources of error in the ultimate analysis of organic substances containing nitrogen;" upon which an interesting discussion took place.—"On certain Bismuth-compounds," by Mr. M. M. P. Muir.—"On Bismuthiferous Terseral Pyrites," by Dr. W. Ramsay.

METEOROLOGICAL SOCIETY.

NOVEMBER 17TH.—Dr. R. J. Mann, President, in the chair.—Serjeant J. Conroy, Mr. M. Jones, Mr. A. H. Leycester, Sir D. L. Salomons, Bart., and Mr. J. P. H. Walker were duly elected fellows. The following papers were read:—"Some Remarks on the Reduction of Barometric Readings, with a Form of Table for combining the Corrections for Index-Error, Temperature, and Altitude," by Mr. W. Marriott. Readings of the barometer to be of any scientific value must be corrected for index-error, temperature, and height above mean sea level. There is not much difficulty in applying the first two, but it is a very troublesome thing to obtain the proper corrections for altitude if the station be more than a hundred feet above sea level. The author has found that a great number of observers make some very extraordinary mistakes in applying this correction, and gives a few as specimens. He attributes the difficulty in applying this correction to the unsatisfactory explanation accompanying the tables as given in the different manuals on meteorology, and to the fact of the corrections being only given for two pressures, viz., twenty-seven in. and thirty in. He then submits a table which gives the sea level pressure on the left hand and the reading of the barometer at the station corresponding to that pressure on the right hand, with the altitude correction between them. In conclusion, he submits a form of table in which is combined the correction for index-error, temperature, and height above sea level, which is the means of saving much time, besides reducing the liability to error. "On a Continuous Self-Registering Thermometer," by Mr. W. Harrison Cripps. The thermometer consists of six coils of glass tubing, the first five being wound concentrically round an axis, each coil lying within the other in such a manner as to form a spiral glass wheel four inches in diameter. The sixth coil is moved slightly away from the others, so that it shall form the circumference of a circle five inches in diameter, the centre being the axis round which the spiral tube is coiled. Pivots are attached to either end on the axis, which rests on two parallel metal uprights. The tubing is filled with spirit, and mercury and a small quantity of air are enclosed in the large coil. The thermometer works in the following manner:—When the spirit contracts on cooling, the expansion of the included air keeps the column of mercury in contact with it; this immediately alters the centre gravity, and the wheel begins to revolve in a direction opposite to that of the receding mercury. On applying heat, the mercury passes forwards, and the wheel moves in the opposite direction. The thermometer is made to record somewhat in the same way as the recording aneroid barometer. "On a Self-Registering Atmometer," by Mr. S. H. Miller.

GEOGRAPHICAL SOCIETY.

DECEMBER 13.—Major-General Sir H. C. Rawlinson, K.C.B., President, in the chair.—The following gentlemen were elected: Col. G. M'Andrew, Major J. Ramsay, Messrs. E. Bickers, E. Birkbeck, C. Ford, R. G. Graham, R. B. Hanson, W. Heeley, E. W. Hodge, T. F. P. Kavanagh, A. Lee, M. J. Lothian, J. Macauley, J. Rahles, T. F. Ryder, A. G. Stirling, W. Westgarth, and M. Williams.—The paper read was, "Ascent of the Mai-Kassa River, New Guinea," by Mr. O. Stone.

NOVEMBER 29TH.—Major-General Sir H. C. Rawlinson in the chair.—The following gentlemen were elected Fellows: His Excellency Nubar Pacha, as Honorary Corresponding Member; Sir B. H. Ellis, Sir D. Salomons, Bart., Hon. D. Arnot, Hon. W. Littleton, Hon. F. Parker, Col. C. Elliot, Col. Haughton, Col. Sir L. Pelly, Capt. J. Borlase, Capt. H. W. Feilden, Capt. R. W. Pelly, Capt. G. T. Plunkett, Capt. F. W. Sidney, Lieut. H. C. Harford, Lieut. G. C. Sconce, Lieut. J. Watson, Rev. E. W. Bullinger, Rev. W. Bullock, Dr. L. Cape, Dr. A. Leared, Dr. Munro, Messrs. F. J. Angier, A. J. Atkinson, G. Baker, J. Benson, W. P. Bonnor, G. Bourne, A. H. Clarke, G. FitzRoy Cole, E. Coombe, J. W. S. Coward, T. A. Cragoe, W. D. R. Douglas, J. H. Duckham, W. H. G. Duncan, J. G. Elsey, C. F. Gahan, W. Gayfer, A. F. Haslam, A. G. Henriques, H. A. Herbert, J. W. C. Honeybourne, A. J. Howard, M. Jephson, J. Kennedy, D. W. Kettle, J. Knight, J. Laing, I. C. Lambert, J. I. Menzies, S. H. Needham. W. E. Oates, F. Oxley, J. T. Pierce, F. E. F. H. Pohl, W. D. Rawlins, W. C. Roberts, J. F. Russell, H. Sewell, C. E. Shepheard, H. Smith, E. W. Stanton, A. Streeter, A. Strong, J. M. Stuart, W. Tomlinson, A. M. Walls, J. H. Waters, J. Weedow, H. T. Wesley, G. Hampden, G. H. Whalley, E. D. J. Wilson, and J. S.

Wilson. The paper read was, "On Mr. H. M. Stanley's Exploration of Lake Victoria Nyanza," by Lieut.-Col. J. A. Grant.

GEOLOGICAL SOCIETY.

NOVEMBER 17TH.—J. Evans, Esq., President, in the chair.—Messrs. R. E. Cooper, G. Fowler, and W. Frecheville were elected Fellows. The papers read were: "On a New Modification of Dinosaurian Vertebræ," by Prof. R. Owen; and "On the Presence of the Forest-bed Series at Kessingland and Pakefield, in Suffolk, and its Position beneath the Chillesford Clay," by Mr. John Gunn.

December 1st.—J. Evans, Esq., President in the chair.—M. Rodolfy de Arteaga, W. H. Barnard, the Rev. J. Clifford, M.A., Lieut-General R. F. Copland-Crawford, W. Derham, J. Duigan, G. R. Godson, the Rev. A. S. Grenfell, Sir D. Salomons, Bart., A. Strahan, W. Thomas, E. Wethered, the Rev. B. Wilkinson, and E. A. Wunsch, were elected Fellows.—The following communication was read: "On the Granite Granitoid, and Associated Metamorphic Rocks of the Lake District, Parts III., IV., and V." by Mr. J. C. Ward.

ANTHROPOLOGICAL INSTITUTE,

NOVEMBER 23RD.—Col. Lane Fox, President, in the chair.—Mr. J. W. Simpson was elected a Member. The President read a full report, prepared by himself, "On the Excavations lately made by the Exploration Committee of the Anthropoligical Institute in Cissbury Camp, near Worthing, Sussex," and illustrated it by a series of diagrams and models, and a large collection of flint implements, flakes, &c. The animal remains found in the excavations, including the skeleton of a woman, were exhibited and described by Prof. Rolleston.

INSTITUTION OF CIVIL ENGINEERS.

NOVEMBER 23RD.—Mr. T. E. Harrison in the chair.—The President, before commencing the ordinary business, referred to the recent decease of Mr. C. B. Vignoles, one of the oldest members of the Institution, who occupied the chair in the years 1870 and 1871. The paper read was "On Experiments on the Movement of Air in Pneumatic Tubes," by M. C. Bontemps, an account of which is given in another column.

December 7th. Mr. T. E. Harrison, President, in the chair—The following candidates were elected: Messrs. W. Butler, A. Johnston, J. Kennedy, C. B. Le Mesurier, W. Robinson, J. W. Rundall, W. Stevens, E. G. Strong, G. T. Walch, and J. S. Whitlock, as Members; and Major C. A. Adelskold, Lieuts. A. S. W. Connor, W. H. Johnstone, J. B. Lindsell, and W. H. Rathbone, Messrs. F. H. Anson, W. Bailey, E. F. Bamher, J. Brady, B. J. E. Bruce, J. Brunlees, P. Bulmer, R. Cail, W. T. H. Carrington, J. Cartwright, J. Coates, C. Currey, J. H. Dawson T. I. Dewar, W. J. Doherty, J. Donaldson, G. S. Edwards, H. O. Fisher: W. O. Gooding, A. Grant-Dalton, F. Griffith, R. C. Harris, R. C. Humberow, H. E. Hill, W. G. Izard, H. L. Monk, A. Murray, T. J. F. Nicolls, T. F. O'Meara, R. Quigly, P. Reynolds, W. H. P. Sherman, E. A. Sibold, W. K. Stent, A. D. Stevenson, H. S. Stewart, J. Tate, R. H. Thurston, N. N. Vasalekar, Z. Walker, jun., S. Watkins, T. E. West, A. R. Wilson, R. Wilson, and G. B. Witts, as Associates.—The paper read was, "On the Brighton Intercepting and Outfall Sewers," by Mr. J. G. Gamble

ASTRONOMICAL SOCIETY.

DECEMBER 11.—Prof. Adams, President in the chair.—Mr. Burton read a paper "On the Southern Nebulæ 30 (Bode) Doradus and the Nebula about η Argûs." Mr. Burton had, while stationed at Rodrigues, on the Transit of Venus Expedition, made drawings of these nebulæ with a 12½-inch silver or glass reflector, and on his return had compared them with Sir John Herschel's drawings. After a careful comparison he was not disposed to think that there had been any great change in either of the nebulæ since the date of Sir John Herschel's observations.—Mr. Ellery, of the Melbourne Observatory, described the observations which they had made of the same nebulæ with their great Melbourne 4-feet reflector. He was inclined to think that rapid change could be traced, not only in the details of the nebulæ, but also in the relative positions and magnitudes of the stars which appeared to be involved in them. Mr. Ellery also read a paper "On the Results of some Experiments with Huygens's Parabolic Pendulum for Obtaining Uniform Rotation." The instrument he had used consisted of a heavy weight, or bob, attached by a thin flexible band of watch-spring steel to the upper part of a piece of metal cut into the form of the evolute of a parabola; this was attached to a revolving axis, so that the contrivance formed a conical pendulum, in which, when the rate of motion was increased, the bob or pendulum flew away from the axis, and wound the watch-spring band round the evolute of the parabola; this was attached to a revolving axis, so that the contrivance formed a conical pendulum, in which when the rate of motion was increased, the bob or pendulum flew away from the axis, and wound the watch-spring band round the evolute of the parabola. He found that with this contrivance a very uniform rate of motion was obtained, which appeared to be independent of the weight which was placed on the bob of the pendulum and of the driving power used.—A paper by Mr. With, "On the structure of Coggia's Comet," was read. On the night of the 8th of July, 1874, an oscillatory motion of the fan-shaped jet in front of the nucleus was observed. The fan seemed to tilt over from the preceding towards the following side, and then for an instant appeared sharply defined, then it became nebulous, and all appearance of structure vanished. These pulsations and appearances of structure occurred several times, at intervals of from three to eight seconds.—Mr. Ranyard read a paper "On the Duplicate Structure of Coggia's Comet." He showed two drawings, each made on the 14th July, 1874, the one by Mrs. Newall with the great refractor at Gateshead, and the other by Mr. With at Hereford. Both drawings showed that on that evening there were two faint parabolic arcs which intersected one another in front of the nucleus of the comet; the axes of the arcs were parallel to one another, and were separated by a distance of about 1°. During the earlier evenings of July the inner parabolic arcs within the envelope of the comet had been drawn by several observers as double and overlapping, but the axes of the two sets of envelopes were much less separated than those of the arcs visible on the evening of the 14th. Mr. Ranyard suggested that possibly a disruption was going on, similar in character to the disruption which took place in Biela's comet as it approached perihelion in 1846.—Father Perry showed some photographs of the transit of Venus, which had been sent to him from Manilla. They appeared to show the body of Venus projected on a bright background outside the sun's limb. It was suggested, however, from other evidence, that the photographs must have been taken from drawings. Lord Lindsay and Mr. Brothers, after an examination of the photographs, both inclined to the latter view.

MATHEMATICAL SOCIETY.

DECEMBER 9th.—Prof. H. J. S. Smith, President, in the chair.—Major J. R. Campbell and Prof. G. M. Minchin were elected Members.—the following papers were communicated: Prof. Clifford, "On the Transformation of Elliptic Functions," by an application of Jacobi's geometrical representation of the addition-theorem in elliptic functions to the theory of their transformation.—Prof. Cayley, "On a System of Algebraical Equations connected with Malfatti's Problem."—The Chairman, "On a Problem of Eisenstein's," "On the Joint Invariants of two Conics or two Quadrics," and "On the Equation P × D= a Constant of the Geodesic Lines of an Ellipsoid,"—and Mr. H. W. Lloyd Tanner, "On the Solution of certain Partial Differential Equations of the Second Order, having more than two Independent Variables."

ENTOMOLOGICAL SOCIETY.

DECEMBER 1ST.—Sir S. S. Saunders, President, in the chair.—T. Chapman, Esq., was elected a subscriber.—Mr. W. A. Forbes exhibited a variety of the Burnet Moth, *Zygœna filipendulœ*, with yellow spots, of which he had bred a number from larvæ taken from Winchester.—Mr. Champion exhibited some rare British Coleopetera.—Mr. W. Cole exhibited carefully executed drawings of the pupæ of a species of the dipterous genus Ephydra, which he had taken clinging to the stems of grass in brackish water near Southend, Essex.—The President referred to the numerous parasites found on bees of the genus Osmia, and remarked that M. Jules Lichtenstein had recently obtained *Zonitis prœusta* from the cells of *Osmia tridentata;* and likewise, *Euchalus vetusta* Duf., from its dessicated adult larvæ, in the same way that *Halticella osmicida* effects its metamorphosis, thus making the thirteenth parasite recorded as infesting this particular species of bee.—A paper was communicated by Dr. Burmeister, giving a description of a new genus belonging to the family Scaritidæ (nearly allied to Clivina), taken on the shore of the River Uruguay, near the town of Concordia.

PHILOLOGICAL SOCIETY.

DECEMBER 3RD.—E. L. Brandreth, Esq., in the chair.—Mr. C. B. Cayley read a paper, "On Genitive Forms," endeavouring to show how the natural arrangement of sexual designations (first male and then female) might cause them to acquire different phonetic forms, as where the Aryan feminine is distinguished by a strengthened vowel, or else to be associated with different pronouns; as in the Hebrew prefixes and affix, the English *he* and *she*, &c. He also traced the defective declension of the Aryan neuter noun to the fact that it had ordinarily no need to appear in a vocative construction.

COLLEGE OF PRECEPTORS.

DECEMBER 15TH.—Rev. G. C. Bell in the chair.—Mr. A. J. Ellis read a paper "On the School and College Pronunciation of Greek."

PSYCHOLOGICAL SOCIETY.

NOVEMBER 18TH.—Mr. Serjeant Cox, President, in the chair.—Mr. G. Harris read a paper "On Calligraphy as a Test of Character." A long discussion followed, in which Prof. Leone Levi and others took part.

December 2nd.—Mr. Serjeant Cox, President, in the chair.—Mr. R. W. Parker, Mrs. C. Hobson, and Mrs. S. Dixon were elected Members.—The President read a paper, "On Professor Tyndall's Article, 'On Materialism,' in the *Fortnightly Review.*" A long discussion followed, which was adjourned to the next meeting.

MICROSCOPICAL SOCIETY.

DECEMBER 1ST.—H. C. Sorby, Esq., President, in the chair.—Three new fellows were elected.—A useful addition to microscopes with concentric rotating stage was exhibited by Mr. Crouch, by which the instrument could be accurately adjusted to the centre of the stage when different objectives were employed.—Dr. Lawson exhibited and described a new apparatus, termed the Hematimetre, designed by M. Hayem and constructed by M. Nachet, for the purpose of estimating the number of corpuscles in a given quantity of blood.—Prof. Bennett called attention to some minute organisms discovered at the base of the tentacles upon the leaves of Drosera and other carnivorous plants, and which he regarded as being intimately connected with the processes of nutrition; and some further remarks upon the subject were made by Mr. Slack.—An interesting paper was read by Prof. W. R. Jones, "On Foraminifera, with special Reference to their Variability of Form." The subject was profusely illustrated by large diagrams, enlarged models and microscopic preparations; and a short discussion followed, in which the President and Mr. C. Stewart took part.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

DECEMBER 7TH.—S. Birch, LL.D., President, in the chair. The following papers were read: "Notice of a very Ancient Comet, from a Chaldean Tablet," by Mr. H. Fox Talbot.—"On Babylonian Augury, by Figures and Geometrical Signs," by Rev. A. H. Sayce, M.A.,—"On the Assyrian Belief in the Immortality of the Soul, as Illustrated by the Twelfth Izubar Tablet," by Mr. W. Boscawan,—"On the First Sallier Papyrus," by Prof. E. S. Lushington,—and "On Two Ancient Maps of the Holy Land," by Mr. S. M. Drach.

EXPERIENCES IN THE FAR WEST.

UNDER the above title, Mr. C. B. King, C.E., gave an interesting lecture on the United States, and particularly the Western portions of it, at the Croydon Farmers' Club. Mr. King will probably be remembered by many of our readers as the author of a very attractive paper read at the Inventors' Institute some years ago.

SCHOOL BOARDISM.

IT is now clearly apparent (as we have often asserted), that by the working of the School Board Law, it is intended, if possible, to bring all systems of elementary education under Government control.

Recently police-court prosecutions have been taken against the scholars of the Ogle-street Ragged School, it being alleged that that school was instructionally inefficient, and several children brought up before the magistrates, (doubtless more or less terrified by a vague feeling of standing as culprits at the Bar of Justice), being found not up to the Government standard, it was required that such children should be withdrawn from the Ragged school, and placed at the Board school, though why it is to be assumed that the Board school can make these particular children, who may be exceptionally dull at book-learning, sufficiently educated, no one can say.

Mr. Knox the magistrate (who certainly seems to have taken great pains in examining the children and considering the case) expressed that he felt himself bound to carry out the law to the letter. Doubtless this may be the view of dispensing criminal law usually taken by those pragmatically inclined people y'clept "active magistrates;" but the general prevalence amongst judicial functionaries of the idea that they are not permitted to exercise a wise discretion in applying the law in all its strictness to cases brought under their consideration would render life unbearable, and occasion a social revolt, for it may be safely asserted that at the present day the number of petty offences which may be the subject of prosecution would, if unrelentingly dealt with, cause our daily life to be one of systematic police supervision, differing only in form from that of the police tyranny of the Continent, but in its actual effect far surpassing it as a social irritant.

It is a great pity the magistrates too commonly deal with this question of School Board education in this narrow spirit, because the permanence of a thorough system of elementary education by State provision cannot fail to be prejudicially affected by making it distasteful to everybody except a few zealots and those who get their living by it. Moreover, the suppression of all other than Board schools must greatly increase the local taxes, and inevitably lead to reactionary movements.

Since writing the above, we find that the Earl of Shaftesbury, by a letter in the *Times*, appears to be in accord with our views.—[Ed. S.R.]

ICELAND.

ON Thursday, December 18th, Mr. George Browning delivered a very interesting lecture on Iceland, at the Society of Arts, before the British Scandinavian Society; his Excellency the Danish Minister in the chair. Mr. Browning also exhibited his ethnographical collection, consisting of national dresses, silver ornaments, MSS., photographs, &c., from Iceland, the Faröe Isles, and Greenland. The meeting was well attended, and at the close a vote of thanks accorded to the lecturer.

PRICE OF GAS IN AMERICA.

THE following are the current rates for gas paid by consumers per one thousand feet:—

	Dols.
Albany	2.50
Baltimore	2.75
Boston	2.50
Chicago	3.37½
Cleveland	2.50
Concord	3.20
Harlem	3.00
Lowell	2.75
Manchester	2.70
New York	2.75
New Orleans	3.00
Oswego	3.50
Rochester	3.50
St. Louis	3.25
Syracuse	3.25
Troy	3.25
Washington	3.56
Hamilton	3.00
Kingston	3.50
London, Canada	3.00
Montreal	2.60
Quebec	2.80
Toronto	2.50

APPLICATIONS FOR LETTERS PATENT.

October 29th—(*Continued from page 2.*)—T. Adams. Safety valves.—T. A. Edison. Autographic printing.—W J. Hinde. Self-acting bolts or catches.—E. Edwards. Manufacrture of bent or curved soft metal tubes, and apparatus used therefor (com.)—W. Goodwin. An improved combined grain and bulk cargo weighing machine, sack filler, and automatic register.—A. M. Clark. An improved method of colouring and enhancing the appearance of furs (com.)—J. Coignard. Machinery for sewing sails and heavy work of a like character.—C. H. Murray. Machinery for manufacturing bricks, tiles, and pipes.—R. Mothersell. Means for facilitating the adjustment of sewing machine needles in their bars.—F. D. Ward. Manufacture of protective paper on which safety cheques, bills, notes, and other documents may be printed.—H. E. Newton. Heating of furnaces and steam generators, and the apparatus used in connection therewith (com.)—(Complete specification.)

On October 30th.-3772 to 3785.—J. W. Wood and W. H. Shakespear. Train signalling and apparatus for the same—H. S. Paget. Painting ornamental and other designs upon china, wood, iron, paper, silk, canvas, and other similar fabrics.—G. H Jones. Painlessly adapting artificial teeth by atmospheric pressure.—H. W. Scott. Lawn tennis wells and ball-carriers.—W. Lockwood. Construction of steam boilers.—A. Richards. Garments adapted to the saving of life from drowning (com.)—I. L. Bell. Manufacture of iron.—R. Duthie. Machinery for steering ships and other vessels.—J. Bardell and E. Blakemore. Breech-loading small arms.—J. M. Holmes. Manufacture of blade or plate springs for carriages and for other purposes, and in machinery and tools to be used in the said manufacture (com.)—J. Liddell. Machinery for polishing stone.—W. L. Wise. Manufacture of boots and shoes (com.)—W. R. Lake. Application of hydraulic power for dredging purposes, and in machinery therefor (com.)—W. R. Lake. Metallic alloys or compounds for protecting iron surfaces, and in separating and evaporating apparatus to which such alloys are applied to protect the same from oxidation or corrosion (com)

On November 1st.—3786 to 3796.—J. S. Dronsfield. Apparatus for grinding the card-flats and card rollers employed in carding engines.—J. C. Mewburn. Silk fabric (com.)—J. Cooper. Self-acting apparatus for tilting or suspending casks and barrels. J. H. Johnson. Motive power engines and apparatus connected therewith (com.)—G. Raynor. Method of constructing subaqueous tunnels.—G. Scarborough and W. Alison. Looms for weaving.—R. Birkby Cupulas for melting metals.—S. Johnston. Harvesting machines.—T. Morgan. Reducing ores, coal, cement, and other substances (com.) G. Zanni. Magneto-electric telegraph signalling, indicating and printing apparatus, applicable for steering vessels, mining, railway. and other purposes.—F. F. Burlock. Feeding apparatus for carding machines and other machinery for treating fibrous materials (com.)

On November 2nd.—3797 to 3810—R. Lavender. Blast Lamps.—S. E. Phillips and W. C. Johnson. Telegraph cables.—T. Blanchfield. Umbrellas, parasols, and articles of a like description.—J. Bradbury and G. F. Bradbury. Apparatus for cutting and working wood.—C. M. Lloyd. Construction and adaptation to a person or persons of self-inflating air capacities for saving life at sea.—T. A. Warrington and C. Harwood. Machinery or apparatus for cutting cork and other like substances.—T. Moore. Rotary engines.—J. Finney. Medical preparation or preparations applicable to the treatment of what is known as "Foot and Mouth Disease" in cattle, being a specific therefor.—C. Cottew. Combination and arrangement of marine boilers for the economy of fuel and occupying less horizontal space in the ship than ordinary boilers of the same power.—A. E pinasse. Puddling ovens and puddling apparatus.—D. G. Fitz-Gerald. Appliances and means for signalling through long submarine telegraph cables and other circuits.—J. H. Bailey. Apparatus for securing railway points to protect trains in passing over them.—A. Hollings. Hydraulic presses.—H. M. Walker. Bush for making a perfectly tight joint between the boiler tubes and tube plates of marine, locomotive, and other steam boilers (com.)

On November 3rd.—3811 to 3828.—E. Schrabetz. Couplings for railway stock.—W. Williams. Fountain penholders, partly applicable to other penholders.—W. J. Tillyer. Application of boss with stop-valve for opening and closing the supply upon the application or removal of a tap.—H. McColl. Rivetting, punching, and shearing apparatus.—T. L. Taylor. Press for burnishing or polishing photographs, cards, or other similar articles.—A. Fryer. Means of and apparatus for raising sunken vessels and other submerged bodies.—H. Reid and H. A. Hubbersty. Grinding machinery for grinding mineral and other substances.—J. Imray. Friction clutches.—W. Palliser. Construction of terrace dwelling houses.—J. H. Palmer. Breech-loading fire-arms.—S. M. Moschcowitz. Garment for ladies' and gentlemens' use, so-called indispensable American overcoat.—S. Morrisson. Construction of wheel or roller skates.—A. Ransome. Machinery for felling trees.—R. G. Jack. Bicycles.—W. Knell. Screws and screw drivers.—S. Cornforth, F. Ratcliff, and W. H. Ratcliff. Manufacture of gas for illuminating and heating, and apparatus employed in the said manufacture.—T. Mathews. Meters or apparatus for measuring and indicating the flow of fluids.—A. Vacherot. Rotary engines, rotary pumps, and other like apparatus.

On November 4th.—3829 to 3848.—C. J. Barnes. Protectors applicable to thrashing machines.—J. Howard. Apparatus for sorting or separating mixed corks and cork squares into separate sizes.—H. Hahn. Apparatus for carburetting atmosphetic air for illuminating purposes (com.)—W. S. Mappin. Fasteners for bands, straps, ribbons, and the like—G. Macartney. Couplings for fire hose or other pipes or tubes.—W. J. Morier. Apparatus for beating, churning, or mixing liquid or partly liquid compounds.—M. J. Roberts. Steam boilers to prevent their priming.—W. Brookes. Machinery or apparatus to be used in the manufacture of piled fabrics such as velvet or velveteen (com.)—J. Steel and R. Steel. Morticing machines—W. White. Apparatus used in the manufacture and distribution of gas.—G. H. Andrews. Table knives.—T. Holt and J. Schofield. Arrangements for imparting motion to the grate bars of furnaces.—W. Jackson. Furnace and apparatus for dessication of coal or fuel, and utilising its products for cookidg heating, and locomotive purposes.—E. Davis and S. Wilson. Machinery and apparatus for propelling navigable vessels, partly applicable to various other useful purposes.—W. C. Stiff. Stop-valves (com.)—H. W. Whitehead and F. H. Wright. Means or apparatus used in washing or scouring wool or other fibres.—A. M. Clark. Apparatus for regulating and governing the working of engines and machinery (com.)—R. Lee. Machinery or apparatus for embossing and glazing leather and other material.—A. W. Turner. Washing machines.—W. R. Lake. Knitting machinery (com.) (Complete specification.)

On November 5th.—3849 to 3862.—J. Cleminson. Apparatus for feeding steam-boilers with hot water.—J. T. B. Bennett. Retort, and arrangement of retorts, for manufacturing gas and other purposes.—H. Lander. Agricultural implements, commonly called "Collectors."—J. Leeman. Apparatus for releasing ships' boats.—W. Brownhill, jun., and T. H. Smith. Expediting the manufacture of open-jointed, welded-jump, and lap-jointed, or other tubes of iron, steel, or other metals, and apparatus therefor.—J. R. Wigham. Audible fog and other signals.—J. Wilson. Apparatus to be used in making worts for distilling purposes from certain kinds of grain.—J. C. Ward. Making available for musical instruments of the pianoforte kind a much lighter frame than is at present used, by applying a new system of stringing and a new action with noval arrangements as to the key board, and adapting this frame together with a new kind of hinge and an improved appliance for obtaining harmonies mechanically (and also for making jacks), and the adaptation of the concertina finger board for the first time in connection with any stringed instrument to the construction of a new instrument called "the harmonic seraphlute."—J. Urquhart and W. W. Andrews. Wet gas meters.—T. Pasfield. Regulating the supply or pressure of steam in steam breaks.—M. G. Lloyd. Machinery for trimming lawns and cutting sods.—W. Crookes, F.R.S. Apparatus for indicating the intensity of radiation.—W. R. Lake. Relating to fog horns or trumpets (com.)—T. Jenks. Composition useful for many purposes in connection with the arts and manufactures.

On November 6th.—3863 to 3872.—G. J. Newton. Machinery or apparatus applicable to bobbin net or twist lace machines.—B. Munro. Connected with tools for cutting coal, stone, slate, marble, or similar materials.—J. B. Handyside. Machine tools or apparatus for grinding or finishing metallic surfaces.—R. J. S. Joyce. fasteners for purses, portmonnaies, and other like articles (com.)—M. Neuhaus and J. E. Hodgkin. Steam pumps, partly applicable to other similar purposes (com.)—J. Butterworth, W. Dickinson, and C. Catlow. Looms for weaving.—W. R. Lake. Motor for sewing and other machines (com.) (Complete specification.)—G. T. Bousfield. Precipitation of copper and other metals from solution (com.) (Complete specification.)—C. Mace and J. Brewster. Tube stoppers for stopping the ends of split or leaky tubes in steam boilers and staying the tube plates.—A. B. Fraser. Pumps for ships and other purposes, and apparatus for working the same.

On November 8th.—3873 to 3882.—J. H. Johnson. Apparatus for propelling and steering ships or vessels (com.)—H. Cocking. Sewing machines.—F. Pearn and S. Pearn. Steam engines, partly applicable for use in combination with pumps and various other mechanism.—J. T. Way. Manufacture of woollen and silken fabrics, and of soap and detergents for use in these manufactures, and for other purposes.—E. E. Glaskin. Railway vehicles (com.) W. Dean and A. Orrah. Means of and apparatus for weaving and for cutting pile fabrics.—H. Gardner. Mowing and reaping machines (com.) — W. Morgan-Brown. Machines for carding or dressing woollen and cotton goods in which teazles are replaced by rotating cylinders (com.)—T. Perks. Earrings.—A. M. Clark. Projectiles for fire-arms (com.)

On November 9th.—3883 to 3890.—H. Fisher. Moulds for casting sinking cylinders, large pipes, hollow piles, and other large cylindrical articles.—G. Plant. Apparatus for welding, flanching and shaping metal plates suitable to be employed in the construction of steam generators.—W. Clark. Preventing or diminishing priming in steam boilers.—R. S. Casson. Puddling furnaces.—W. Young and R. Brown. Dressing, shaping, and cutting stone, marble, slate, and similar materials, and in cutting or getting coal and other minerals, and in apparatus therefor.—D. S. Semple. Apparatus or means for collecting fares and distributing tickets on tramways or other conveyances, and other places where regular fares have to be drawn.—J. W. Tattersfield. Machinery or apparatus for finishing woven fabrics.—H. E. Millar. Reversing gear of steam and other motive power engines.

On November 10th.—3891 to 3911.—W. Green. Manufacture and treatment of soaps, and combining therewith certain parts of natural matters. also apparatus or means therefor, also applicable to other soaps.—E. Taylor. Heater for economizing fuel and water for high pressure steam engines.—W. Richmond. Improved apparatus for lowering, detaching, and hoisting ships' boats.—W. Morgan-Brown. Hose-pipe couplings, and mechanism for attaching such couplings to hose pipes (com.)—W. Morgan-Brown. Improved raw hide shoe tip or protector for the uppers of boots and shoes (com.)—W. Morgan-Brown. Sewing machines (com.)—E. T. Hughes. Rowing gear (com.)—J. H. Brown. Construction of appliances for the prevention of sickness arising from the motion of ships and vehicles.—J. Nimmo. Signalling on railways, and machinery or apparatus employed therefor.—E. E. Geflowski. Means for cancelling or defacing postage stamps. — J. Richardson. Traction engines for common and other like roads.—G. Clark. Composition, production, and application of bituminous compounds.—M. Mirfield and J. Scott. Machinery for combing wool and other fibrous substances.—F. Mori. Improved thermo-regulators.—R. Aitken. Construction of bridges.—E. Cannington. Kilns for annealing glass.—H. F. Stanley. Cooling and refrigerating apparatus.—E. A. Inglefield. Anchors.—W. Trick, D. Davis. E. F. Daniel and T. D. Phillips. Manufacture of iron.—J. Knowles. Steam engines.—A. M. Clark. Tanning hides and skins (com.)

On November 11th.—3912 to 3930.—J. Spencer. Hansom cabs. — R. W. Brownhill and W. Brownhill, jun. Treating heated strip iron for facilitating its conversion into tubes whether openjointed or welded.—F. Kenyon. Police and other head dresses. — H. P. Truefitt. Tooth brushes.—A. C. Henderson. Warping machine (com.)—R. Dobie and P. Forbes. American stoves or close cooking ranges and modes and means of heating the ovens thereof.—J. H. Storey and I. Storey, jun. Self-closing taps or valves.—W. F. Padwick. Coop for poultry or game.—H. Deacon. Apparatus for exposing porous materials and currents of gases to mutual reactions.—W. Wright. Roller skates, and means of making or building up rollers for skates. — W. Morgan-Brown. Musical instruments, known as American organs, or those known as suction instruments (com.) (Complete specification.)—A. M. Clark. Floodways for warehouses and other buildings (com.) (Complete specification.)—H. W. Warden. Apparatus for igniting and extinguishing a number of gas lamps simultaneously.—E. C. Vickers and A. Freestone. Boots, shoes, "uppers," or "tops," for boots and shoes, leggings, and other such like articles.—R. Hunt. Facilitating transit on steep inclines and apparatus and carriages to be used therefor.—W. Bow. Steam-steering apparatus, partly applicable to starting gear of steam or other motive power engines and to hoisting machinery.—J. Jackson and T. Jackson. Construction of injectors, ejectors, and ejector condensers. W. R. Lake. Machinery for hulling, cleaning, polishing, and separating coffee and other grain or seed (com.) (Complete specification.)—A. Angst. Apparatus for screwing soles on boots and shoes, applicable also for uniting other thicknesses of leather.

On November 12.—3931 to 3949.—J. D. Allatt, and J. A. Patton. Stoppering the necks of bottles containing aërated and other liquids.—W. B. Thompson. Windlasses, partly applicable for other purposes.—J. M. Macintosh. Tobacco pouches and other like receptacles.—G. Bennie. Retorts and their fittings and appurtenances connected therewith for the distillation of shale, coal, or other oleaginous or bituminous minerals or earths. (Complete specification.)—G. Edwards. Fastening sliding sashes, cupboards, tables, &c.—A. H. Cramp. Apparatus for playing the game of quoits.—W. Haworth and J. Thompson. Weaving sacks or bags and folded fabrics, and apparatus therefor.—C. Morfit. Manufacture of dietetic foods.—G. Duddell. Roller skates, also applicable to other wheeled carriages. (Complete specification.)—E. Johnson. Ear pendants.—J. Hayward and W. Hoyland. Umbrellas and parasols.—B. Whitley. Machinery for shaping and facing bright screw nuts and for facing sockets for tubing.—A. V. Newton. Manufacture of pianofortes (com.)—T. Cornforth, J. Cornforth, jun., F. Ratcliff, and W. H. Ratcliff. Steam blowing apparatus.—E. Deeley. Manufacture of metal tubes.—H. Kdeinau. Manufacture of adhesive seals (com.)—A. V. Newton. Process for preserving meats (com.)—W. H. Bliss. Roller skates.—T. Marshall. Manufacture of waterproof coats or garments and other articles of dress.

On November 13th. — 3950 to 3964. — T. Lovell. Apparatus for indicating and registering the inequalities or imperfections in the permanent way and rolling stock of railways and tramways.—A. Angst. Apparatus for pegging the soles on boots and shoes. C. A. Faure. Steam boilers.—E. de Pass. Apparatus connected with the twisting and untwisting of threads for cleaning them by friction (com.)—T. Fletcher. Apparatus employed for bleaching cotton or other fibrous substances or fabrics.—T. Shaw and W. Blackburn. Means or process of treating or preparing dry soap or other washing preparations in a dry state ready for domestic or other purposes.—H. A. Bonneville. Means of producing figured surfaces, sunk, and in relief, coloured or not, on leather and skins, and of printing therefrom (com.)—A. A. Moss. Manufacture of fruit preserves.—P. Jensen. Apparatus or apparel for protection against fire and smoke (com.) (Complete specification).—I. Carlton. Ingot moulds used for casting Bessemer steel and other steel ingots.—H. Tubbs. Roller skates. — H. Gardner. Ventilating railway carriages (com.)—G. Keel. Construction of roller skates.—I. C. Thompson. Filtering and apparatus therefor (partly com.)—J. D. Lee and J. Crabtree. Looms for weaving.

On November 15th.—3965 to 3973.—W. Inglis. Arrangements and apparatus for storing grain or other materials afloat (com.)—G. Clark and A. F. Spiller. Manufacture and production of bituminous compounds for the construction of skating-rink flooring or paving. — S. Hill. "Back-sights" for rifles.—J. S. Raworth and B. A. Raworth. Machines for winding cotton, silk, or other yarns.—J. Eaglesham and H. Rigg. Mode and means of cooling and lubricating air or gas pumping machinery.—G. Nurse Preparing metal (black) plates to be coated with tin or lead and apparatus to be used therewith or therefor.—A. M. Clark. Valves for steam engines (com.)—J. Frost. Nut-lock for railway fish bolts and for other like purposes.

On November 16th.—3974 to 3987.—F. Isitt and D. Farrer. Roller skates.—J. T. King. Registering the number of passengers carried on omnibuses (com.)—R. Theiler and M. Theiler. Electric telegraphs.—J. W. O'Toole. Motive-power engines.—H. A. Bonneville. Apparatus for measuring water or other liquids (com.) (Complete specification.)—G. Paton. Dyeing or dressing or sizing and otherwise preparing warp yarns, and apparatus therefor.—W. Boulton. Machine or apparatus for pressing or forming articles in pottery or in the brick and tile trade.—C. N. Birkhead. "Willeys" or "teazers" employed for cleaning wool, cotton, or other fibrous substances.—A. E. Redstone. Printing known as the Redstone card printing press.—A. Browne. Mechanical apparatus or horse to be worked by steam, gas, or other motive power, and designed to replace or substitute animals of draught in general (com.)—H. Cherry. Steam engines and direct steam pumping engines. — M. Amos Tools for dividing longitudinally the end of a bar of iron or other metal.—J. R. Atha and J. Terry. Method or means for facilitating the teaching of the pianoforte and similar keyed instruments. A. M. Clark. Apparatus for automatically releasing horses from carriages (com.)

On November 17th.—3988 to 3998.—A. M. Clark. Excavating machine (com.) — J. Bowing. Filter-presses.—W. MacLellan and J. P. Smith. Construction of railway sleeper chairs.—D. Mc'Gregor. Instrument for directly verifying compass indications.—T. Morison. Washing machines.—J. E. Wadsworth. Machinery for spinning wool, cotton, and other fibrous substances.—P. Jensen. Tubular flues for steam boilers (com.)—C. E. Bates and E. Money. Method of and means for advertising. — N. Thompson. Rack pulleys for window blinds.—J. Betteley. Ships and boats and appliances relating thereto.—E. Lock and G. E. Chapman. Arrangements applicable for the securing and firmly holding together sheets or leaves of paper and other materials.

On November 18th.—3999 to 4010.—A. Browne. Electro-magnetic engines and galvanic battery to be used therewith, the said battery being also applicable for other purposes (com.)—J. Joseph. Portable light holder, particularly applicable for reading in railway and other carriages and elsewhere.—Robert Mackie. Spinning carpet, blanket, and other yarns, and the machinery or apparatus employed therefor. — R. Griffiths Steam spips and other vessels, and the arrangement and number of the screws for propelling the same.—J. B. Thwaites and W. T. Thompson. Fasteners resembling nails or screws, and modes of and apparatus for driving the same.—A. Mutton. Roller skates.—D. Brown. Apparatus for stoppering bottles.—G. N. Dunn. Life-boat or raft, and apparatus or mechanism to be used therewith.—W. Mc'Geoch. Automatic letches or fastening bolts.—H. Ashton. Taps and valves combined.—A. H. Blanche. Machinery or apparatus for singeing woven fabrics.—J. Martin. Manufacture of umbrellas, sunshades, and parasols. — T. Matthews. Arrangement of railway junctions to obviate or lessen the risks attending the passage of trains over facing points.—P. Clarke. Spark arresters for locomotive and other high pressure engines (com.)—W. R. Lake. Printing presses (com.) (Complete specification.)

On November 19th.—4014 to 4027.—W. B ke, W. Shaw, and E. Fulton. Packing cases or crates.—R. W. Brownhill, Machinery for the manufacture of brick for building purposes, is also applicable for moulding or giving form to other materials required to be pressed into shape, such as moulded fuel and the like.—J. B. Cole. Brooms.—B. Britten. Manufacture of glass.—R. E. G. Neumann. Safes and similar structures.—D. Anderson. Ventilator applicable for ventilating the rooms of dwelling houses and other structures.—A. How. Tobacco pipes.—F. Canard and C. Mouillera. Drilling or boring apparatus applicable to sinking artesian and other wells.—J. Wheeler. Apparatus fer holding and displaying shirts and other articles.—H. Hughes. Tramway or road locomotives. W. E. Gedge. Plough (com.)—W. E. Gedge. Safety envelope for letters (com.)—W. R. Lake. Machinery for making plumber's traps (com.)—E. Newton. Frame saws.

On November 20th.—4028 to 4044.—T. Melling. Modes of and apparatus for regulating pressure in pipes or other conduits.—T. Wright. Apparatus or arrangement for heating public and private buildings, and also for drying purposes. —W. Grune. Means of storing and transporting mineral oils and the products thereof, as petroleum, kereosine, benzine, naptha, and others.—J. Macintosh. Treating the tissues and intestines of animals.—M. Benson. Apparatus for cleaning the fire flues of steam boilers. H. S. Till. Machinery for aiding the manufacture of earthenware and porcelain plates and dishes and other articles of a like description.—A. McLean. Portable ambulance, especially adapted for the use of persons maimed and injured by railway, street, and other accidents, invalids, and bed-ridden persons.—J. W. T. Cadett. Roller or wheel skates, applicable also to other skates.—J. W. Reford. Distilling apparatus.—(Complete specification.)—C. Fairbairn. Machines for the manufacture of screw bolts.—J. R. Chis'ett. Construction of wheel or roller skates —J. M. Holmes. Mechanism or apparatus for feeding fuel into furnaces, fire boxes, and fire grates.—W. Gilbee. Producing designs on hard substances by the sand blast (com.)—J. Leyland. Machinery for grinding spindles.—F. Virtue. Apparatus or appliances for trimming or paring linseed and like cake.—W. King. Apparatus or appliauces for treating oleaginous seeds (com.)—G. Grundy. Carburetters.—G. E. L. Dawson. Manosacture of fire-arms and projectiles for the same.—G. B. Whitford. Folding seats.—W. F. Smith. Lathes.—R. S. Bartlett. Sewing machine needles and needle bars, also the means for adjusting and retaining such needles to their respective bars, also applicable for other useful purposes.—E. Burstow. Roller skates.—W. Spence. Self-acting brakes for use on railways, tramways, or common roads (com.)—J. Cameron. Steam pumps.—J. Farmer. Letter press printing machines.—E. Milner. Manufacture of white lead.—E. G. Wheeler. Manufacture of ice and machinery or apparatus employed therein, parts of which are also applicable to other cooling and refrigerating purposes (com.)—F. Lipscombe. Articles to be employed in architectural ornamentation.—M. H. H. King. Automatous disengaging apparatus and an improved method in constructing ships' davits, suspending, fixing, hoisting and lowering ships' boats, loading and unloading of merchandise, sacks, timber, store, and may be used for other purposes.—C. McEvoy. Petroleum stoves.—W. Ailan. Machinery for applying screw stays to boilers.—R. Armstrong. Pumps and apparatus to be used in connection therewith.—R. C. Rayson. Shuttles of looms for weaving.—A. Le Tellier. Apparatus for purifying and filtering water and treating sewage.

On November 23rd.—4062 to 4072.—J. Smith. Apparatus for pleating fabrics.—T. Hyatt. Buildings, building constructions, and building materials, partly applicable to ships.—L. J. Roucou. Bronzing copper, brass, zinc, and other materials, and for preventing the discolouring of gold, silver, and other materials.—A. Potheto:. Apparatus for, and the means of raising water.—J. Martin. Prevention of fouling of iron ships' bottoms and marine iron-work. —H. Baggeley. Compound or material suitable for buildings and other structures, pavements, and other usefnl purposes, also glaze and cement for the same applicable to varions useful purposes —J. S. Scott and E. de Poilly. Apparatus for the instantaneous lighting of gas burners in towns, theatres, public rooms, private dwellings, and other places, also applicable as automatic gas gauge.—T. J. Smith. Railway signals and apparatus therefor (com.)—H. Brookes. Mode of constructing ships or vessels of war, or other ships or vessels, either of wood or iron, or other metal or material, to protect the same against shot or shell, torpedoes or rams.—L. Kaberry. Applicable to drawing frames for preparing cotton and other fibrous materials for spinning.—G. Cay. Apparatus for for use in brush-making.

On November 24th.—4073 to 4084.—D. Rees. Compounding feet jelly tablets.—A. Crowther. Connections of apparatus for withdrawing liquids from casks or store cisterns.—L. Sterne. Screw nuts.—J. Hutchison. Window blinds.—W. Morgan-Brown. Loom shuttles and shuttle spindles (com.)—J. Firth. Taps for steam and other fluids.—H. B. Barlow. Fermentation of beer, and apparatus emploped therein. (com.) —J. Thompson. Horizontal compound engine. —J. G. Tongue. Machines or apparatus for setting carriage springs (com.)—E. Atkins. Sash fasteners.—G. Thorneloe. Gas, water, and steam valves.—W. Macdonald. Protection of certain property called a watch from loss, either by theft or accident, to any person wearing the same.

On November 25th.—4085 to 40?7.—A. Gilmore. Drake or brake for the bobbins of spinning frames.—E. Martin. Weaving.—W. A. Ross. Stands or cases for products and advertisements.—E. P. Alexander. Mode or method of and apparatus for effecting the carbonization of vegetable materials contained in wool, woollen rags, or other animal substances (com.)—T. Miller. Brake blocks for street railway cars or other vehicles.—C. Whittard. Constructing carriage roads and footways.—J. Wilson. Apparatus or means for utilizing the waste heat of steam boilers.—G. B. Kennings. Use of coal, oil, and other oil as fuel (com.)—T. Keith. Crates or frames for holding bottles.—A. Brown. Ornamentation of clan tartan, and fancy wood work, and the means employed therefor.—W. Atkinson, E. Mann, and W. H. Mann. Fuel economizers for household and other fire-ranges.—D. A. Aird. Tobacco pipes. C. Myring. Manufacture of handles for bags, portmanteaus, rug straps, and other similar articles.

On November 26th.—4098 to 4118. — W. P. Thompson. Preserving food and other perishable articles, and apparatus or appliances therefor (com.)—G. S. Dodman. Picture frames, ornamental table mats, screens, and other similar articles.—C. G. Roger-Durand. Self-acting knitting-machine needles.—H. Hilditch. Hydraulic motive power engines.—J. T. Price. Ruling machines.—J. H. S. Wildsmith. Collection and treatment of human excreta and other refuse or waste animal substances used in the manufacture of artificial manure and the apparatus used therefor, partly applicable to other purposes. — C. Fournereau. Bottles employed for the carrying of chemical productions or other purposes.—R. Bell. Manufacture of blacking.—J. Wavish. Apparatus for heating, ventilating, and disinfecting.—J. Duncan and B. E. R. Newlands. Treatment and purification of sugar and of saccharine matter, and the apparatus employed therein.—T. B. Willans. Finishing woollen fabrics and apparatus therefor. —Peter Mc'Laine. Packing material and the method of manufacturing the same.—W. Dawes. Construction of beams or girders.—J. Hill. Apparatus for extracting fluids from barrels and other vessels.—C. Garner and A. Rycroft. Umbrella frames and the joints thereof.—J. Patzschke. Billiard tables to afford greater variety in the character of the games played thereon. —H. Handyside. Railway rolling stock.—W. T. Henley. Construction of submarine telegraph cables, and the mode of insulating the conductors used therewith, applicable to other telegraphic purposes.—P. Pfleiderer. Machines for kneading and mixing various substances or materials (com.)—W. R. Lake. Manufacture of illuminating gas and apparatus therefor (com.)—E. L. Paine and L. Nelson. Electro-magnetic motors (com.)

On November 26th.—4119 to 4127.—T. M. H. Flynn. Mode of recording the number and fares of passengers using vehicles, and apparatus therefor.—A. Dunlop and W. Ree. Machinery, tools, and tool-holders for cutting or dressing stone, slate, marble, and other similar substances.—J. L. W. Thudichum. Treatment of certain descriptions of wine, for the purpose of purifying them and improving their quality.—J. Bannehr. Means for intercepting and treating excreta and other matters of sewage.—W. Morgan-Brown. Machines for sewing gloves and the thread catcher to work therewitth (com.)—T. Hoadley. Friction roller bearings.—J. M. Napier. Speed indicators and speed regulators or governors.—J. M. Butt and J. Herring. Apparatus used in the purification of gas.—D. F. Cameron. Steam boiler and other furnaces for the combustion of coal and similar fuel (com.)

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London: Printed by H. W. FOSTER, 14, Fetter Lane, Fleet Street E.C.; and Published for the Proprietors at 21, Cockspur Street, Charing Cross; and Sold by W. KENT & Co., 23, Paternoster Row, and SAMPSON LOW, SON, & MARSTON, English, American, and Colonial Booksellers and Publishers, Crown Buildings, 188, Fleet Street, London, E.C.

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